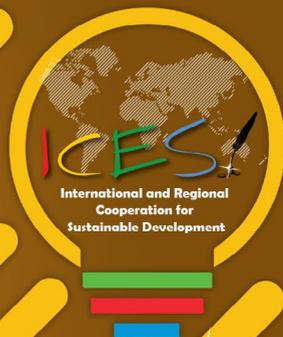


# INTERNATIONAL CONFERENCE ON ERITREAN STUDIES



January 04 - 06, 2025  
Asmara, Eritrea

Book of  
**ABSTRACTS**

**COPYRIGHT**      **CULTURAL AND NATURAL HERITAGE**      **LANGUAGE**

**SUSTAINABLE DEVELOPMENT**      **DEVELOPMENT**      **AGRICULTURE**

**HISTORICAL LINGUISTICS**      **CULTURE AND SOCIETY**

**ASMARA HERITAGE**      **ECONOMIC STUDIES**

**CONSERVATION**      **ANTHROPOLOGY**

**NATIONALISM**      **BIO-MEDICINE**

**THE INTERNET**      **ARCHAEOLOGY**

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**ENVIRONMENT**      **MARINE SCIENCES**

**MEDICAL SCIENCES**      **CLIMATE CHANGE**

**COLONIAL ECONOMICS**      **SHADOW EDUCATION**

**ERITREA - EU REALATION**      **ERITREA - US REALATION**

**ART AND LITERATURE**      **ALTERNATIVE ENERGY**

**POLITICAL CULTURE**      **HUMAN TRAFFICKING**

**ERITREAN LANGUAGES**      **LIBERATION STRUGGLE**

**IGAD**      **EARTH SIENCESME**      **INVESTMENT**      **RESEARCH**      **FARMING**

**FOREIGN POLICY**      **ROCK ART**      **CARRICULUM REFORMES**      **DIASPORA**

**LAW**      **NATURAL HAZARDS**      **PHYSICAL SCIENCES**      **COMPUTING**

**HISTORY**      **ARCHIVES**      **REGIONAL POLITICS**      **IT**      **MATHS**      **MUSIC**



# **International and Regional Cooperation for Sustainable Development**



**INTERNATIONAL CONFERENCE ON  
ERITREAN STUDIES**

Book of Abstracts

January 4-6, 2025  
Hotel Asmara Palace  
Asmara, Eritrea

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# Preface

The International Conference on Eritrean Studies of 2025 (ICES 2025) is being held on January 4 – 6 of 2025 under the theme of “International and Regional Cooperation for Sustainable Development”. The purpose of the conference is to promote research on Eritrea both qualitatively and quantitatively by providing ample spaces for international visibility. It is also a platform and an invitation for national and international scholars and researchers to join for collaborative efforts. The Conference is expected to play a key role in encouraging individuals, groups, and institutions for sharing and managing researches on Eritrean studies by creating a global forum and network with emphasis on peacebuilding and contemporary sustainable development issues.

We have received about 250 abstracts from around the World, including local researchers. The abstracts cover a range of issues including agriculture, archaeology & heritage, BRICS, earth science, economics & development, education, engineering, environment & climate change, history, language & linguistics, law and governance, marine sciences, medicine & health sciences, politics and technology that cuts across regional and international spheres. After a rigorous process of blind reviewing, finally, 152 abstracts are qualified for presentation. However, this was by no means an exhaustive process. Nor was it easy task to select the final 152 papers. The organizing Committee do value all abstracts whether they are selected or not, and would like to express its sincere gratitude to all those who responded to our call.

Following are the abstracts that have been selected for presentations.

## Agriculture and Marine Sciences

### **An alternative Approach for Measuring Adoption of Climate-smart Agriculture in East Africa: Insights from Eritrea**

\* Tesfai Tesfai Kidane: (Unit Head, Sectoral Planning. Ministry of Agriculture)

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**Selam  
Conference  
Centre  
Day 3  
2:40 – 3:00**



Mr Tesfai holds BSc in Agricultural Economics from Hamelmalo Agricultural College, Eritrea. He obtained his MSc in 2019 in Agricultural Economics and Management from China Agricultural University, Beijing, PRC. From 2019 to 2023, he was a Lecturer and Coordinator for Agricultural Economics and Freshman courses at Hamelmalo Agricultural College, Keren, Eritrea. From 2014 to 2017, he was Graduate Assistant, at Hamelmalo Agricultural College. From 2011 to 2014, he was a teacher in Adi-Ugri Secondary School, Mendefera. His research interests include: Agricultural Development, Food and Nutrition

Security, Climate Smart Agriculture and Sustainable Food Systems. He has published several peer-reviewed publications.

Adoption of climate-smart agriculture (CSA) practices is essential to ensure food and nutrition security amidst the challenges posed by climate change. This study focuses on identifying and validating key indicators for assessing CSA adoption in East Africa, with a particular emphasis on Eritrea. Through a systematic review of East African studies and a participatory approach involving key informants in Eritrea, 42 potential indicators were identified. These indicators were subsequently evaluated for their relevance and feasibility within the Eritrean context. Employing these indicators, this study discusses the climate smart features, opportunities and challenges of the current food and nutrition security strategies in Eritrea. Additionally, the study proposes a methodology for developing a Climate Smart Index (CSI) to comprehensively measure CSA adoption in data-scarce environments. This research aims to support evidence-based decision-making and promote resilient and sustainable agri-food systems in East Africa.

**Keywords:** Adoption, Food Security, Indicators, Climate Smart Agriculture, Eritrea

## **Climate-Change Adaptation Strategy Using Supplementary Irrigation in Semi-arid Agro-Ecosystems of Eritrea**

\*  
Tesfalem Weld-  
esslassie Ghebretnsae:  
(Hamelmallo Agricultural  
College, Eritrea)

\* Elsayed Said Mohamed: (Na-  
tional Authority for Remote Sensing  
and Space Sciences Cairo, Egypt)

\* Woldeslassie Ogbazghi:  
(Hamelmallo Agricultural College,  
Eritrea)

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**Saloon  
Akurdet  
Day 1  
3:00 – 3:30**

The potential of supplementary irrigation (SI) in boosting rainfed cereals is proved to be successful in Eritrea. However, analysis of SI as an adaptive strategy to climate change for rain-fed agro-ecosystems is lacking. In view of this, the objective of this study is to quantify the crop water requirement in semiarid region of Eritrea in order to evaluate the contribution of supplementary irrigation to climate change adaptation in the short, medium and long-term perspectives. Mean observed (at 0.5o x 0.5o resolution) and projection (at 0.25o x 0.25o resolution) data,

obtained from Climate Change Knowledge Portal of World Bank Group, were utilized for this study. The observed data which is sourced from the Climatic Research Unit (CRU) of the University of East Anglia is used for baseline condition (1995-2014). The Climate projection data which is modeled from global climate model compilations of the sixth's phase of Coupled Model Inter-comparison Projects (CMIP6) is employed for analyzing the impact of climate change on CWR for the crop growing season of 2020-2039, 2040-2059, and 2080-2099 time-series under SSP5-8.5 climate change scenario. The generated monthly reference temperature (1995-2014) validated using observed latest climatology (1991-2020), compared using coefficient of determination ( $R^2=0.9$ ) and were found at par. The generated outputs were used to determine monthly potential evapotranspiration using the Blaney-Criddle equation. Crop coefficients were taken from FAO irrigation manual and compared with locally studied values. The product of crop coefficient and reference evapotranspiration gives rise to water requirement of a given crop. Under SSP5-8.5 climate change scenario, during 2020-2039, 2040-2059 and 2080-2099 crop growing season, potential evapotranspiration will likely increase comparing to reference period by 10,13 & 18.4 % for sorghum, 2.5, 5 & 10 % for maize and 1.3, 4 & 9 % for pearl millet, respectively. Under same scenario option and during the same crop growing seasons, crop water re-

quirement is predicted to increase by 12, 15 & 20% for sorghum, 2.8, 5.2 & 10.2 % for maize and 1.2, 4 & 9.3 % for pearl millet over reference season, respectively. Net irrigation requirement of all crops will increase in all growing seasons except in 2080-2099, due to substantial increase of rainfall, as compared to reference season. Potential production of the target crops cannot be achieved without supplementary irrigation during all growing seasons including the reference period in all growth stages except late season growth stage. If this option is impractical, then application of supplementary irrigation at the critical stages (mid-season growth stage) to rainfed crops can be employed as an adaptive strategy to climate change.

**Keywords:** Irrigation, Evapotranspiration, Crop water requirement, Climate change, Global Climate Model, rainfed-agro' ecology

## **Conservation Strategies for Sustainable Agriculture Ecosystems: Assessing the Role of Eritrean Heteroptera**

\*

Daniel BRHANE:  
(Hamelmallo Agricultural College, Eritrea)

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**Saloon  
Massawa  
Day 1  
5:40 – 6:00**



The order Heteroptera – or commonly known as true bugs – is the most species-rich and diverse group of hemimetabolous insects. Many of the included species are providers of ecosystem services, e.g., regulation of harmful arthropod species in agricultural or aquatic ecosystem, or nutrient cycling. However, the anthropogenic activities, e.g., pollution, habitat loss, or climate change pose threats to their populations. Effective conservation strategies, including habitat preservation, integrated pest management practices, community engagement and social awareness raising, are es-

essential for mitigating these threats and ensuring the persistence of beneficial heteropteran insects. Eritrea, a country situated in the Horn of Africa, harbors a diverse fauna of heteropteran insect species – a sum of 283 species belonging to 28 families were recorded from the country to the date –, many of which play significant roles in the agricultural, natural and semi-natural ecosystems. However, the knowledge regarding their exact distribution in the country is incomplete, thus the importance of included taxa is difficult to assess precisely. Our extensive review explores the available literature data on important heteropteran species known from Eritrea, formulates suggestions to address the knowledge gaps and proposes conservation measures to safeguard their populations in order to maintain sustainable agriculture yield. By prioritizing the conservation of these economically and ecologically valuable insects, Eritrea can enhance agricultural resilience, promote biodiversity conservation, and foster sustainable development goals.

**Keywords:** Eritrea, Heteroptera, biodiversity conservation, ecosystem services, sustainable agriculture

## Nutrition KAP and MDD-W Survey with Emphasis on Fish Eating Practices in Eritrea

\* Eden Tareke (PhD)

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**Selam  
Conference  
Centre  
Day 3  
2:20 – 2:40**



Dr. Eden Tareke is an accomplished nutritionist who earned her PhD from the Department of Environmental Chemistry at Stockholm University (SU). Her doctoral thesis, “Identifications and Origin of Potential Background Carcinogens: Endogenous Isoprene and Oxiranes, Dietary Acrylamide,” focused on background sources of exposure to carcinogens, and during her PhD, Dr Tareke discovered the formation of acrylamide in heated foods.

Dr. Tareke pursued her postdoctoral research at the Oak Ridge Institute for Science and Education, FDA’s National Center for Toxicological Research. She served as a principal investigator of her projects at the department Biochemical Toxicology, Department for

Personalized Nutrition & Medicine, and Department for Neurochemistry.

Subsequently, she worked as a research scientist at Lund University (LU) in the Division of Applied Nutrition and Food Chemistry, where she led projects dealing with the formation of advanced Glycation End Products and their role in inflammation and related complications (non-communicable diseases), developed methods for analyzing toxic chemicals in food and blood/plasma, lectured, and supervised MSc and PhD students.

Since 2016, Dr. Tareke has dedicated her efforts to contributing her extensive expertise and knowledge in Eritrea.

Eritrea has untapped marine resources of 1,350 km along the Eritrean coastline and the inland reservoirs. To strengthen the fishery systems and increase producers' household nutrition status, the Ministry of Marine Resources, has been conducting the Fisheries Resources Management Programme (FReMP). In 2021, a nutrition KAP and minimum diversity for women (MDD-W) survey, complemented by Focus Group Discussions (FGD) was conducted. The survey aims to elicit what is known (knowledge), believed (attitude), and done (practiced) in maternal and child nutrition and fish-eating practices among care providers of children aged less than five and to be used as a baseline data for nutrition-sensitive interventions and

measure the impact of the project on maternal and child feeding practices with an emphasis on fish consumption in Eritrea.

## Methods

The survey included 1,470 Women of Reproductive Age (WRA) between 18 and 49 years and was conducted nationwide in all six Zobas covered by the project FReMP. The background characteristics (age group, education level, type of family, Zoba, and residence) were investigated as possible factors that affect Nutrition Knowledge, Attitude, and Practices during the first 1000 days, focusing on fish-eating habits.

## Results

About two-thirds (63%) of the study participants reported including fish in their meals, of which only 37% consume fish more than once a week. The reasons cited for not consuming fish were affordability (31%) and distance to the market (18%). The study showed a clear difference in fish-eating practices between the coastal and the inland Zoba and lower consumption of vegetables and fruits among respondents from coastal Zobas.

During FGDs, participants mentioned a lack of awareness of nutrition and food preparation, limited access to land and water, traditional values, and the frequency of extreme weather events as main drivers affecting their

food and nutrition security. Moreover, FGD participants from all Zobas explained that eating fish is perceived as less prestigious than slaughtering a goat. Additionally, FGDs showed that the misconception that eating rich foods during pregnancy leads to an increase in the size of the child and that delivery complications were widespread.

Dietary diversity among women. The Minimum Diversity for Women (MDD-W) survey showed that 44.2 % of women achieved Minimum Dietary Diversity (5 out of 10 food groups). The mean score calculated using descriptive analysis was 4.43 (95% CI: 4.35, 4.52), and a standard deviation of 1.65. The factors revealed to be determinants of MDD-W were Zoba, educational level, and ethnicity.

### Conclusion

The study revealed the need for awareness in nutrition. It has to be noted that this study was conducted in areas covered by the project FREMP and may not reflect the fish-eating practices nationwide.

**Keywords:** Fisheries Resources Management Programme, KAP, Minimum Dietary Diversity, Nutrition, Women of Reproductive Age .

## **Pasta Enriched with Catfish (*Arius thalassineus*) Protein Concentrate to Augment Food Security**

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malo Agricultural College,  
Eritrea)

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**Selam  
Conference  
Centre  
Day 3  
2:40 – 3:00**

Pasta is a widely consumed staple food made from wheat dough without fermentation, known for its easy preparation and popularity. Typically, pasta is made from durum wheat semolina. On the other hand, catfish, a freshwater fish belonging to the Siluriformes order, is a low-cost source of protein. However, due to pasta's composition mainly consisting of cereals like wheat, it may lack certain essential amino acids, leading to protein deficiency when consumed as a staple food in daily meals. In Eritrea, fish consumption is quite low, resulting in inadequate protein intake and common protein deficiency in the society. To address this issue, the study aimed to enhance the nutritional content of pasta by adding different percentages (0%, 5%, 10%, and 15%) of catfish protein concentrate. Therefore, producing

healthier pasta spaghetti enriched with essential amino acids (EAAs) and other micronutrients is of great interest not only to secure food in the country but also to researchers and manufacturers as well. Various analyses, including proximate composition, color, cooking properties, microbial evaluation, sensory assessment, and storage stability over four months, were conducted using a completely randomized design. Enriched pasta with catfish protein concentrate showed significant increases in crude protein (10.9– 25.48%), fat (0.3–0.32%), and ash (0.65–0.73%), with optimal results achieved at 5% and 10% supplementation. Additionally, sensory evaluations indicated higher preference for pasta enriched with 5% catfish protein powder. Microbial analysis confirmed that the shelf life of pasta supplemented with CFPP exceeded four months, making it a viable solution for addressing food security, malnutrition problems and ensuring effective fish utilization. Therefore, incorporating 5-10% catfish protein concentrate in cereal-based fortified pasta is recommended for food product fortification purposes.

**Keywords:** Cat-fish protein, Food Security, Food Safety, Fortification, Pasta production, Nutritional enhancement, Fortification .

## Smallholder Farming Development in Sub-Sahara Africa: Potentials, Constraints and Policy Implications for Sustainable Development

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**Selam  
Conference  
Centre  
Day 3  
2:40 – 3:00**



Mr. Natnael Aregawi is a Graduate Assistant at the Department of Economics and Finance, College of Business and Social Sciences (CBSS), Adi-Keih. He earned his Bachelor of Arts in Economics in 2021 from College of Business and Social Sciences. As a young academician, Natnael Aregawi has a high vested interest in conducting research especially on development issues. Within a short period, he has published some articles, including the presented paper for the conference.

A well performing agricultural sector in SSA to a greater extent depend on the sustainable farming system of

smallholder farmers, the dominant producers in SSA. Sustainable farming system is a prerequisite to sustainable human development: sustaining livelihoods of smallholder farmers, eliminating poverty, promoting the advancement of women-headed rural households engaged in farming activities and regenerating natural resources and environment. Thus, empowered smallholder farmers with adequate capital assets have the ability to increase their productivity, reduce food insecurity, poverty and dependency on cereal imports reduction.

Using the sustainable livelihood framework, the overall objective of the study is to explore the necessary conditions for the transformation of smallholder farms to contribute to household and national level food security, reduce poverty and dependency on food imports for SSA countries.

However, smallholder farmers have faced several constraints, including, traditional farming techniques, lack of access to formal markets, lack of skill, lack of access to financial services and inappropriate government policies. Declining agricultural performance is a major driving force behind growing poverty among African smallholder farming populations, and its recovery offers the greatest prospects for rural populations to escape out of poverty. As a result, sub-Saharan African countries have faced triple challenges: (i) ensuring food security and adequate

nutrition for all, (ii) strengthening livelihoods of smallholder farmers and reduce the level of poverty incidence (iii) ensure sustainable development through sustainable use of natural resources and other resources.

Notwithstanding the constraints facing smallholder farmers in SSA, the way out of poverty and ensuring food security is development of the smallholder farms to increase their productivity. To those ends promotion and empowering of producers' association to increase their bargaining power, increase public investments in agricultural research and development that takes into account the needs of smallholder farmers, promotion of agricultural extension services in favor of small holder farmers, increase public funding for natural resources development with a focus on soil and water conservation and water harvesting, promotion of Integrated land-use strategies that actively consider the various environmental and resilience benefits of natural vegetation are suggested.

Keywords: Agriculture, Smallholder farming, Sub-Saharan Africa, Sustainable livelihood.

## **Soil Organic Carbon Modelling Using Soil, Spatial, Climatic, Topo- graphic, and Geologic Data: Case Study-Gash Barka, Eritrea**

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Tesfay: (Hamelmallo Agri-  
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**Saloon  
Massawa  
Day 1  
5:20 – 5:40**



Mr. Tumuzghi Tesfay has a BSc in Land Resources and Environment and an MSc in Applied Soil Science from Hamelmalo Agricultural College (HAC). He has worked as a lecturer at HAC since 2016. He is currently a PhD student at RUDN University, Russia. His PhD dissertation deals with soil organic carbon modelling in Eritrea for the betterment of soil, ecosystem and climate Melake Tewelde Bereket is Assistant

Soil Organic Carbon (SOC) modelling is very critical for assessing, planning and monitoring soil fertility, ecosystem restoration and climate-change mitigation. However, there are no such studies in Eritrea. Thus, the study aimed to develop a robust SOC prediction model for the Gash Barka Region, Eritrea, using easily measurable and accessible soil, spatial, climatic, topographic, and geologic data through machine learning using python 3.10. Ninety-two soil samples were collected from different agroecological zones (Moist lowland and arid lowland), land uses (rainfed, grazing, natural forest, shifting cultivation, riverine), topographies (elevations, slopes, aspects). The soil samples were analysed for SOC, bulk density, texture, gravel, sand, silt, and clay contents. Multiple linear regression (MLR), partial least squares (PLS), and random forest regression (RFR) algorithms were employed to develop SOC prediction models taking 17 variables as inputs and 92 SOC values as targets. 80% of the data were used for machine training and 20% for testing. The results showed that RFR, with  $R^2$  0.79 and MSE 0.03 outperformed PLS and MLR, with  $R^2$  0.67 and 0.60, and MSE 0.06 and 0.06, respectively. According to the RFR model, the top ten variables important for SOC modelling in the study area are latitude, elevation, land use, bulk density, slope, sand content, aspect, soil taxonomic unit, gravel, and clay contents. Thus, the study concludes that SOC is modelled with good accuracy,

with RFR, using easily measurable and accessible variables. The model will be a useful asset for researchers, planners and decision makers for assessing, planning and monitoring works related to soil fertility, food security, ecosystem restoration and climate-change mitigation.

**Keywords:** Climate-change mitigation, Ecosystem, Food security, Eritrea, Restoration, soil fertility, Soil Organic Carbon modelling, soil, spatial, climatic, topographic, and geological data.

## **Water Resources, Climate Change Constraints and Options for Development in Eritrea**

\* Seife Berhe

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**Saloon  
Akurdet  
Day 1  
2:30 – 3:00**



Dr. Seife Berhe is Founder of Global Resources & Nabro Resources Development Consultants, an environmental consultancy in UK and Eritrea. He is at present Executive Director of Andiamo Exploration in UK/Eritrea. He received

his B.Sc degree in geology from Addis Ababa University in Ethiopia and his MSc in Mineral Exploration & Mining Geology from Leicester University, UK and a Ph.D from the Open University, U.K. As an academic he worked as a research fellow at the Open University, UK as well as part-time lecturer at Asmara University and Eritrea Institute of Technology.

Dr. Seife is involved in various projects that relate to the geology and mineralization of the Arabian-Nubian Shield as well as environmental and water resource projects. He is author of several substantial references on geology, remote sensing, mineral deposits of the Arabian-Nubian Shield and the environment. He has also carried out research and consulting services in Mineral exploration, Remote Sensing, Water resources and Environmental projects in Cyprus, Eritrea, Ethiopia, Kenya, Sudan, Tanzania and the UK.

Eritrea is a water scarce country, where the rainfall is uneven and has no permanent rivers. Environmental degradation is also increasing at an unprecedented rate, which reduces water retention capacity causing depletion of groundwater levels. However, Eritrea has substantial water resources and if properly harnessed can sustainably be used for its economic development as well as its human health needs.

In this study the critical issues pertaining to water management and the threat of climate change, which are often based around sectors with strong

inter-dependencies that are highly exposed to climate variability are documented. In addition, the factors, which have led to their success or failure and those that facilitate or inhibit replication are mentioned.

Based on limited geo-hydrological data, land use classification, and analysis of major river catchments, climatic zones, rainfall patterns population density and water demand the type of water harvesting techniques and technologies that could be applied, which will augment water supply sources as well as address the environmental and social impact with special reference to surface and groundwater are discussed. The results also highlight the need for institutional framework that recognizes and addresses these constraints to enable development goals to be pursued in a more sustainable and climate-resilient manner.

Finally, Eritrea's national development goals will largely depend on the formulation and effective implementation of an integrated water resources development and management strategy based on basin or sub-basin to small watersheds

Keywords: Basin, Climate change, Environmental degradation, Water resources, Water management

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## Archeology & Heritage

### 30 Years of Geo-Paleontological Research in Northern Danakil Depression of Eritrea: The Late Neogene Buya and Engel Ela Basins

\* Lorenzo

Rook: (Università di Firenze, Italy)

\* Bienvenido Martínez-Navarro: (Area de Prehistoria, Universitat Rovira i Virgili (URV), Tarragona, Spain)

\* Tsegai Medin (Commission of Culture and Sports, Eritrea)

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**Selam Conference Centre Day 3 8:30 – 8:50**



Prof. Lorenzo Rook is Vertebrate Paleontologist. He is Professore Ordinario di Paleontologiae Paleocologia Presidente del Consiglio unico del Corso di Laurea in Scienze Geologiche e del Corso di Laurea Magistrale in Scienze e Tecnologie Geologiche DST Dipartimento di Scienze della Terra. Dipartimento di Scienze della Terra

Paleo [Fab] Lab, Università di Firenze, Italia. Co- director at the Eritrea- Italia, Archaeo-paleontological Project-Danakil Depression of Eritrea.

We take the opportunity of this international conference for summarising 30 years of collaborative research and investigation activities in the Late Neogene of the northern Danakil Depression of Eritrea (the Buya and the Engel Ela Basins). These field research activities began in 1994 at the Buya Basin as a small joint project between the Asmara department of Mines (Eritrea), and the Earth Sciences department of the University of Florence (Italy), mainly focused on geological survey and regional geology.

The first surveys carried out in late 1994-early 1995 resulted in the recognition, some ten of kilometres south of the Buya village, of a Pleistocene sedimentary succession rich in fossil vertebrates and (often associated) Oldowan and Acheullean stone tools. The interest for the area increased tremendously in the discovery of an almost complete fossil human cranium in late 1995.

These discoveries gave to the project a much larger focus and requested enlarging the collaborations to a wider spectrum of disciplines (Archaeology, Paleoanthropology) and institutions. On the Eritrean side the renewed project (the Buya research project) had (and has) main counterpart in the National Museum of Eritrea and (since 2016) the Eritrea Commission of Culture and Sports, as well as the Northern Red Sea Regional Museum of Massawa. The project also attained a

wider international collaborative level, including colleagues from Italian Universities different than Florence University (Padova, Rome, Turin) and scientific institutions from Spain and France.

The research activities of the project are documented by a continuous output (see list below), with – since 1998 - more than 30 scientific publications, and more than 30 congress/conferences presentations, including two important conferences in Eritrea: one in 2002 (The role of the Research in Nation building, June 2002) and 2016 (1st International Conference on Eritrean Studies “The Way Forward”, July 2016).

In 2012, following the same goals as the Buya Project and in collaboration with it, an independent Eritrean-Spanish Project emerged to study the Early Pleistocene archaeo-paleontological basin of Engel Ela, located 30 km South of Buya. It started with the association of the National Museum of Eritrea and the Catalan Institute of Human Paleoecology and Social Evolution of Tarragona-IPHES (Spain). Later, since 2016, the Eritrean Commission of Culture and Sports, but also the Northern Red Sea Regional Museum of Massawa were also involved in the research. The results of these investigations have been published, at the moment, in three conferences.

In addition to the above-mentioned scientific outputs, both projects have acted over the years as cooperative platforms for sustainable development. The synergistic actions aimed at developing research aspects with those

of dissemination, and the involvement of local communities fully centers some of the objectives of the 2030 Agenda for Sustainable Development, in particular goals #4 (Quality education), #8 (Decent work and economic growth), #11 (Sustainable cities and communities), #13 (Climate action), #15 (Life on Land). This demonstrates how culture and research initiatives can have an immediate return in terms of sustainable development.

Among of recent examples of actions developed by these projects are lectures to university students and Field schools carried out along research activities, as well as interactions with local people active in local museums and communities aimed to enhancing the value of their geo-paleontological heritage and the local geodiversity.

Keywords: Archaeology, Buya and Engel Ela, Catalan Institute of Human Paleoecology, National Museum of Eritrea, Paleoanthropology,

## Adulis (Eritrea): Sustainable Archaeology in the Horn of Africa

\* Serena

Massa: (Università Cattolica di Milano, Politecnico di Milano)

\* Marco Bocciolone, Susanna Bortolotto & Nelly Cattaneo: (Politecnico di Milano)

\* Tsegai Medin & Abraham Zerai (Commission of Culture and Sports of Eritrea)

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**Saloon  
Massawa  
Day 2  
10:30 – 11:00**



Prof. Serena Massa is Prof. Serena Massa has been Director of the Adulis International Archaeological Mission since 2012. Regular since 2004 of the cataloguing laboratory of archaeological artefacts, Dpt. Of Archaeology, Università Cattolica di Milano; teaching positions at various Universities, Specialization Schools, Academic Masters, director of archaeological Museums. Research activity in international archaeological projects in

the Mediterranean, Africa and Iran. Her research topics are devoted to the archaeology of landscape and the ancient techniques of dry farming, to the study of the necropolis and material culture. Her research methodology develops a multidisciplinary and integrated approach combining archaeology, advanced science and technology such as archaeometry and spatial analysis (GIS).

The Eritrean-Italian Adulis project was born in 2011, after the will of the Eritrean Authorities. In its broader frame Adulis project is methodologically dictated by landscape archaeology. The interest of the research is aimed at investigating all the phases of this historical and cultural landscape to understand the context in which the ancient community found and managed resources for its long-term survival and prosperity, building a broad commercial and cultural networks and system of relationships and social identity of which archaeology reads the material traces that have been preserved up to present time.

The project has been and is carried on following these main strategies: participation of the local communities; stratigraphic investigation; conservation alongside excavation; historic and present landscape analyses; land use and risk assessment: hydrology, farming techniques, renewable energy; planning of a permanent, sustainable research centre within the archae-

ological site; designing a sustainable management plan.

By achieving its specific objectives, the project contributes to the overall aim to design new strategies of heritage sustainable development, enhancing cultural values and highlighting the potential of past civilizations to support problem solving for the present society. This will be the premise to suggest viable alternatives for territorial planning and growth, creating better lives for the people, while preserving the environment and its resources.

Keywords: Adulis, Eritrean Archaeological Heritage, Sustainable Archaeological and Natural Park, Preservation.

### **Application of Digital Tools for Sustainable Management of Heritage Buildings in Massawa, Eritrea**

\* Solomon Tesfamariam:  
(Keynote Speaker)

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Selam  
Conference  
Centre  
Day 1  
10:30 – 11:00

Prof. Tesfamariam is among the top researchers in civil engineering. His research relates to safe and sustainable built environment subject to multiple hazards, such as earthquake, wind, deterioration and climate change. Prof. Tesfamariam has published over 160 peer reviewed journal articles and 70 conference papers. To date, he has over 4800 citations, with an h-index of 37 and i10-index of 110 (Google Scholar).

Massawa is a port city in the Northern Red Sea region of Eritrea that has historically been an important port for centuries. As a result, Massawa has been ruled or occupied by the Ottoman Empire, the Egyptian Empire, the Kingdom of Italy and Ethiopia. As a result of this colonization, Massawa has unique blend of architecture and element details. The historical buildings now crumbling ravaged by war, earthquakes, aging & deterioration, and lack of maintenance. For sustainable rehabilitation and management of Massawa, digitization of the city and developing material passport is of importance. The first part of the presentation highlights the unique architectural details of Massawa and construction material used. Subsequently, heritage building information modelling (HBIM) is developed using low cost and readily available photographs. The HBIM is developed by relying on rectified images through segmentation, tracing polygonal outlines, and developing synthesized façade

drawings. Where the current buildings are severely damaged or missing parts, contextual relation is used in the digitization. Subsequently, using the HBIM digital platform, this presentation will highlight different sustainable and innovative management strategies to revitalize Massawa.

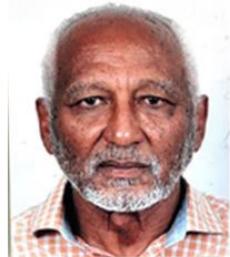
Keywords: architecture, buildings, digitization, heritage, Massawa

### **Asmara as a Contested Modernist African City**

\* Tekle M. Woldemikael:  
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demik@chapman.edu

**Selam  
Conference  
Centre  
Day 2  
4:50 – 5:10**



Prof. Woldemikael is Emeritus Professor of Sociology and International Studies and Peace Studies at Chapman University, Orange, CA 92688.

The paper intends to explore the much contested and diverse perspectives of Asmara as a modernist African city. It examines the two sides of As-

Asmara's identity as a modern, global city and a city with a long history of racial/class/ethnic divides and analyzes the intersections between these two sides.

In exploring these two overarching, interrelated identities, the paper addresses (1) what makes Asmara a modernist city and how its modernist architecture of the Italian colonial period qualified the city to be included on the World Heritage City list; and (2) what makes Asmara a divided, postcolonial city.

Regarding the second theme, the paper will explore how, from its beginning, Asmara has been a racially divided city and show that this hierarchical structure continues to be reflected in its national, class, racial, gender, urban-rural and other divides.

Using the case of Asmara as a thriving African city living under the shadow of its colonial origin and glory, the paper aims to fill a gap in the literature and start a critical engagement on Asmara as a postcolonial African city.

Keywords: Asmara, Modernist City, Modernist Architecture, Origin and Glory, Postcolonial City, and World Heritage City .

## **Asmara: Pioneering the Decentring of Modern Heritage for a Planetary Age**

\* Edward Denison: (The Bartlett School of Architecture / UCL)

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**Selam Conference Centre  
Day 2  
4:30 – 4:50**



This paper explores the themes of just and constructive international engagements through the lens of cultural heritage preservation and sustainable development in the context of Eritrea through its pioneering role in the promotion, protection, and contestation of modern heritage on the African continent.

Using the experience of Asmara's UNESCO World Heritage nomination, this paper critiques the Eurocentric notion of 'value' and the impact of its ascription not only to the tangible and intangible legacies of our collective pasts, but also its application in non-European territories, whose

modern encounters are comparatively unrecognised on the World Heritage List. Asmara's example is particularly instructive, not only because of its conspicuous aesthetic and historical connections to coloniality and structures of power from Europe in the first half of the twentieth century, but also through its intra-African and trans-continental experiences throughout the second half of the century.

This paper therefore argues that to recognise the true value of modern heritage in Asmara, and by extension Africa, it is necessary to decentre and reframe the conceptualisation of modern heritage by adopting a cosmological perspective for a planetary age. This is the aim of the global collaborative, MoHoA (Modern Heritage of Africa / Modern Heritage in the Anthropocene), an equitable network of practitioners, academics, and publics engaged in the decentring of heritage theory and practice.

One of the main outputs of MoHoA has been not only multiple workshops, two international conferences, and the creation of a global resource hub ([www.mohoa.org](http://www.mohoa.org)), but also the Cape Town Document on Modern Heritage, a radical policy proposal presented to UNESCO advocating the reconceptualization of 'modern' heritage that is relieved of its Eurocentric, homogenous, universalising, developmental, and colonial associations, and is instead reframed as an inherently plural

and planetary phenomenon that heralded the Anthropocene.

Keywords: Cultural Heritage Preservation, Eritrea, International Engagements, Modern Heritage, Sustainable Development .

## **Graphic Similarity Between Schematic Rock Art And Archaic Sabaean Writing System Around Adi Keih**

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**Selam  
Conference  
Centre  
Day 3  
9:10 – 9:30**



Ms. Hermela Mehari is a researcher at the archaeological Heritage Research Branch (AHRB) of the Commission of Culture and Sports. She received her Bachelor's Degree in Archaeology and graduated from the college of Business and Social Sciences, Adi-Keih, in the year 2020. Since then, she has been actively participating in several joint archaeological projects and rescue excavations organized by the AHRB. i.e.

Adulis project, Egri-Mekel etc. She is interested in human osteology and ancient epigraphy.

The first evidences of rock art occurred in paleolithic sites in southern Europe, while the archaic writing system appeared in mid Holocene in Mesopotamia. Some scholars argue that the development of Neolithic notations inherited some of the motifs that were in use during rock art era, particularly the schematic type. Indicating, there might be a direct historical continuity between schematic rock art styles characterized by symbolic, abstract drawings and proto-writing system. Eritrea has rock art sites spread throughout its geographical zones, although the concentration varies.

This research paper aims to examine the graphic relation between schematic rock art motifs and early Sabaeen writing system in Eritrea. It deals with some schematic rock art sites and archaic Sabean texts found around Adi Keih for case studies. The hypothesis of this paper is that the archaic Sabean alphabets could have retained some motifs from these schematic rock art.

The methodology employed Include comparative analysis of secondary source materials. The finding of this research indicate there might be a direct evolutionary relationship between schematic rock art and archaic Sabaeen writing system given their graphic similarity.

Keywords: Adi Keih, Comparative Analysis Eritrea, Graphic Relation, Neolithic Notations, Rock Art Era, Sabaeen Writing System.

## **Infrastructure Study for Heritage Conservation at Asmera World Heritage Site (AWHS)**

\* Berihu Te-  
cleab, Biniam Teame, Birhanawi Tecele, Dawit Birhane, Medhanie Teklemariam, Mesghina Estifanos, Petros Sibhat & Zaid Ghebrekidan (Asmera Heritage Office)

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**Selam  
Conference  
Centre  
Day 2  
5:10 – 5:30**



Mr. Berihu Teceleab

Asmera lies on the top of a plateau majestically looking the eastern escarpment of the Red Sea in the east and the rugged hills leading to the lowlands of western Eritrea, and is the capital city of the State of Eritrea. Its elevation is in the range of 2300 meters above sea level. The annual average temperature is in the range of 20 degrees centigrade. Hence, its location with all the

nature endowed parameters makes it ideal for a healthy and conducive living, qualifying it to be the prime city of the Italians and then the capital city of the State of Eritrea. Historically, Asmera means getting united. It derived its enticing name, Asmera, from the unity of four villages living separately in different locations. Its geographical location, conducive climate for living and being a hub from different areas of the nation makes it the most ideal candidate to be a military base for the Italians, when they started their campaign to colonize Eritrea in particular and the Horn of Africa in general. After the Italians started to live and expand their colonial rule, Asmera developed in leaps and bounds. Army and civilians from Italy migrated in large numbers and Eritreans started to be recruited in all the domestic works and military activities.

To make the capital favorable for living the urban planning started from scratch then. Modern asphalted roads, very clean boulevards and majestic new buildings with very unique architectural designs started to flourish in the city. Infrastructures of potable water supply system, properly planned and designed sewerage and drainage systems, buildings for cultural and social entertainments were built. Even though it started in Nineteen Hundred major buildings were built at the peak of the colonial power in 1930s. All the massive developments, industrialization and urbanization qualified Asmera to be one of the most beautiful

and cozy cities in Africa. The new amphitheaters qualified Asmera to be designated to be the New Rome. Hence, Asmera become a model of new architectural design making it to be a center of Cultural Heritage.

Thus, it was due time to launch a scheme to preserve and conserve the rich Cultural Heritage of Asmera the capital city of Eritrea. Hence, as part of the Asmera Conservation Master Plan, the concerned Asmera Heritage Office has prepared an intensive study of infrastructure in the designated Asmera World Heritage Site (AWHS). To make the study more inclusive and comprehensive a proper field study which includes carrying detailed survey in the designated area, compiling data, entering data with a reporting system was conducted. Thus, the study/research is very essential for further launching implementation program of preservation projects as a base line. To spare the rich heritage humble works on roads, sidewalks, and sanitary and sewer systems were done starting the year 2017.

Keywords: Infrastructure, Restoration, Conservation, Heritage, Urban planning.

# Neocolonialism by any other Name: The Origins and Pernicious Effects of Euro-Centric Standards of Beauty in Eritrea

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**Saloon  
Akurdet  
Day 3  
9:00 – 9:30**



Mr. Issayas holds Bachelor's degree in Anthropology and Archeology from Adi Keih College of Business and Social Sciences. He has also Master's Degree in sociology from Central China Normal University, School of Law in Wuhan, China. A full time (for 10 years) and, later part time lecturer (at present), in the Department of Anthropology and Archaeology (now Department of Archaeology and Sociology) at Adi Keih College of Business and Social Sciences. Archaeologist at the Archaeological Heritage Research Center (AHRB) of the Commission of Culture and Sports.

Human beings are unique in that they are, among their other qualities,

equally capable of creating and admiring beauty. This, however, is where the similarity desists, as socio-cultural studies have time and again revealed that standards of beauty are anything but. The diverse, and at times divergent, nature of such standards thus merits an inquiry into how and why Eurocentric standards of beauty have permeated globally.

It is with the intent to unravel the origins and harmful effects of such standards in Eritrea, therefore, that this anthropological study has been undertaken. The methods of data collection range from the classical observational and interviewing techniques in anthropology, to survey methods in the case study area, i.e. Asmara.

The working hypothesis that these standards are the results of colonialism and a globalizing trend heavily skewed towards the West, has in fact been affirmed by the paper. Regardless, the conclusion of the study that such is an instance of cultural imperialism that we ought to rid ourselves of, should be heeded.

Keywords: Racism, white supremacy, neocolonialism, internalized racism, intersectionality.

## **Assessment of Eritrea Illicitly Exported Cultural Heritage Materials: Approaches for Repatriation and Restitution**

\* Tsegai Medin  
(Commission of Culture and Sports)

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**Saloon  
Massawa  
Day 2  
11:00 – 11:30**



Dr. Tsegai Medin is Vertebrate Paleontologist. He is Co-director of the Eritrea- Spanish and Eritrea-Italian, Engel Ella- Ramod and Buia Joint Archaeo-paleontological Projects respectively, and the Eritrea- Italia, Adulis Archaeological Project which was started on the year 2011. Head of the Archaeological Heritage Research Branch at the Eritrean Commission of Culture and Sports of Eritrea. Associate Researcher, at the Catalan Institute of Human Paleocology and Social Evolution (IPHES- CERCA), Tarragona, Spain.

The State of Eritrea is a country with one of the oldest cultural heritage, in all of its wide-ranging diversity. It owns

a unique history overwrought with intense periods of colonial difficulty. It is bound in hardship, resistance and solidarity throughout time. The country was colonized by the Turkish, Egyptians, Italians, British, and later federated and annexed by Ethiopia. Moreover, considering its strategic location it has trade, political and cultural ties with the Arabs, Portuguese, Yemen, Sudan, Kenya and as far as China and India. Hence, during this time, many of its antiquities have been stolen and/or smuggled abroad where they have been sold to interested collectors or exhibited, even now, in internationally renowned museums.

Hence, this paper presents a very preliminary assessments of the places of the stolen and/or smuggled antiquities and propose a possible mechanism to return to Eritrea following UNESCO and UNIDROIT convention support and guidance. Notably, the fact that all these antiquities have not until now been returned to Eritrea does not imply Eritrea's approval of their remaining abroad or denote an intent to relinquish its aspiration to take all necessary steps to bring them home. It is simply a matter of time and Eritrea will comply with all necessary conventions and principles to return back its stolen and/or smuggled cultural objects.

Keywords: Cultural Heritage, Eritrea, Stolen and/or Smuggled Antiquities, UNESCO and UNIDROIT Convention.

## **The Architectural and Urban Heritage in Eritrea: An Approach for Conservation**

\* Medhanie

Teklemariam (Asmara Heritage Office)

\* Corresponding address: medhanetm@gmail.com

**Selam  
Conference  
Centre  
Day 3  
9:10 – 9:30**



Medhanie is a senior urban planner with over thirty years of experience. He has been working as Site Manager of Asmara: a Modernist City of Africa since August 2017 and team leader of the Asmara UNESCO nomination dossier. His work focuses on urban planning, nomination dossier, management, and conservation plans in Eritrea. He has been working as a project manager in urban development and cultural heritage since 2004. He has served as a member of various committees: building, urban planning, and heritage conservation. He has several publications in journals and has presented at national and international conferences on the modernist architectural heritage of Asmara. He is also Prize winner of RIBA President's Medal for 2016 best

research.

Eritrea is situated in a strategic location of the Horn of Africa. Asmara is the capital city located in the centre of the country on a highland plateau. The city was founded on a site where four ancient villages are settled. Its modern urban development began in 1889 with its occupation by Italy. The city became experimental laboratory for the application of modern architecture and urban planning ideas in accordance with its geographical, cultural and local contexts. The city possesses one of the largest concentrations of modernist architecture in the world. Asmara is an outstanding example of the interchange of cultural influences brought about by the encounter with modernity in an African context and bears exceptional testimony to the combination of modern urban planning and modernist architecture in Africa region.

In many African cities and other regions, 20th century architectural heritages have been massively destroyed and swept away from the historic urban landscape under the pretext of modernization, economic growth and searching for new identity. Whereas Eritrea's approach to conserve Asmara's colonial era architecture represents a profoundly different attitude towards modern heritage conservation and its interpretation and treatment compared to many other post-independence urban environments. This continued conservation effort also resulted the inscription of Asmara: A Modernist City of Africa on

the prestigious UNESCO-World Heritage List.

The aim of the paper is to offer an overview of Asmara's urban conservation effort to safeguard its modernist architecture, though the methodology applied in its regional, cultural and historical context is very specific. The approach that is being pursued in Asmara urban conservation process is based on the lessons learned in the region and could be adopted as the best practices of 20th century urban heritage conservation in Africa region or elsewhere in the world.

Keywords: Africa, Architecture, Conservation, Heritage, Region

## **Vertical Archipelago Model and Mountain Adaptation of the Saho Pastoralists in Qohayeto Plateau–Gulf of Zula Culture Area**

\* Robe Haile

(College of Business and Social Science, Adi-Keih, Eritrea)

**Selam  
Conference  
Centre  
Day 3  
8:50 – 9:10**



Comparative studies on mountain adaptation around the world showed striking similarities on multiple aspects; such as transition to food production, sustainability and resilience, and ethnicity and exchange systems. The existence of multiple topographic and climatic (topo-climatic) units located at the different altitudinal zones of the vertical belt of the mountainous region creates a zonal complementarity, where communities inhabiting the various topo-climatic units engage in different forms of exchange systems. Vertical archipelago model was the conceptual and methodological tool invented by cultural ecologists to examine the socio-ecological patterns of resource utilization of mountain dwellers and their inter-community exchange systems.

However, this functionalist oriented theoretical formulation is based on assumptions of linear relationship between ecology and culture, and generally ignores the internal dynamics and historical background of communities. Scholars criticize the fragmentary tendency of ecological studies in mountainous adaptation as being too particularistic based merely on individual house or village. Consequently, this research attempts to systematically study the complex socio-ecological system/foundation of the Saho Pastoralists living in Qohayeto Plateau-Gulf of Zula culture area. This mountainous habitation needs to be studied in a holistic or integrated framework to com-

prehensively understand the adaptive mechanism taking place across the vertical ecological and topographic units. Scanty research conducted before lack holistic and integrated study, and generally were biased by the highland-lowland dichotomy.

This research pioneers the application of the vertical archipelago model and zonal complementarity of the Qohayeto-Zula culture area (with 2700 meters range in elevation). The fieldwork was conducted between September 2014 and July 2015 among the Fäqatə Harakə mela (clan), which occupy the territory from Central Qohayeto to the village of Zula in the Gulf of Zula. Data collection techniques used in this research included participatory observation, interview, oral sources, ethno-historical account, and literature survey. This ethnographic research covers the three Saho clans, who dwell in the cultural zone adjoining the Qohayeto-Zula region. Each mela possesses a tribal territory with four distinct ecological zones ranging from hot island occupation to cool highlands.

The paper presents a preliminary outline of the various topo-climatic units of the mountain adaption of the Saho pastoralists in the research area as its key findings. Four topo-climatic units/zones are identified in this culture area extending from the village of Dəgədəgəta in Qohayeto Plateau to the coastal village of Zula; Highland, Mid Altitude, Coastal Lowland, and

Marine (coast and islands) units. Demarcation of the topo-climatic units is based on the ecological characteristics, and land use pattern of the inhabitants. Finally, this research concludes that a combination of ecological verticality and tribal horizontality are the governing principles of the mountain adaptation of Saho pastoralists.

Keywords: Mela, Qohayeto-Zula, Topo-Climatic Units, Saho Pastoralists, Vertical Archipelago, Zonal Complementarity

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# BRICS

## Decoding Eritrea's Strategic Odyssey; BRICS Expansion and DeDollarization in the Horn of Africa

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**Saloon  
Massawa  
Day 2  
2:30 – 3:00**



Mr Misghina Tekle was born in 1976 in Kodi, a small village near Elaberet in Eritrea. He holds an M.A. (2022-2024) and a B.A. (2018-2021) in History from the University of Agder, Norway. Additionally, he earned a diploma as an Industrial Technician from the Institute of Fioravanti in Bologna, Italy (2005-2008), and a Diploma in Building Construction and Surveying from Mai-Habar Technical School, Eritrea (1997-2000). He is an independent PhD researcher focusing on the conflicting human rights interpretations between Eritrea and Western countries (with a special focus

on Norwegian and US foreign policy towards Eritrea). He is also pursuing a master's in Educational Theory and Practice at the University of Stavanger (2024-2025).

The evolving geopolitical landscape of the Horn of Africa, situated at the crossroads of global powers, demands meticulous scrutiny. This academic inquiry delves into the heart of Eritrea's strategic positioning, navigating the complex interplay of BRICS expansion and the paradigm shift of de-dollarization. Seeking to decode Eritrea's strategic, long, and eventful journey, this study is dedicated to unravel its role in shaping the geopolitical tapestry of the Horn of Africa. In so doing, the study fills the current research lacuna by laying the groundwork for understanding the strategic imperatives faced by Eritrea.

Employing a multidisciplinary approach, this study combines qualitative analysis and case studies. It draws upon primary sources, including diplomatic records and official statements, alongside secondary sources, such as scholarly articles and geopolitical analyses. The methodology ensures a nuanced examination of Eritrea's strategic decision-making processes amidst the global shifts represented by BRICS and de-dollarization.

Therefore, this study contributes significantly to academic discourse by providing a nuanced understanding of Eritrea's strategic choices amidst

BRICS expansion and de-dollarization. It unpacks the complexities of Eritrea's geopolitical landscape, shedding light on its role in shaping regional dynamics. Moreover, the insights gleaned from this research hold immense value for policymakers, offering valuable guidance in navigating the dynamic geopolitical landscape of the Horn of Africa and informing strategic decision-making processes. A comprehensive analysis of Eritrea's strategic responses to BRICS expansion and de-dollarization also serves as a cornerstone for future research endeavours to understand the intricate dynamics of the Horn of Africa's geopolitical environment.

Keywords: Geopolitical, Global Dynamic, Eritrea.

## **Eritrea and BRICS: A Deep Look at Potential Advantages and Challenges**

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**Saloon  
Massawa  
Day 2  
3:00 – 3:30**



Eritrea, a nation striving for post-conflict reconstruction and economic development, seeks strategic partnerships to accelerate its progress. BRICS (Brazil, Russia, India, China, South Africa), an influential economic and political bloc, presents a potential avenue for Eritrea to achieve its goals. Yet, Eritrea's potential accession to BRICS presents a complex scenario with both promising opportunities and significant challenges.

This paper explores the potential advantages Eritrea could gain from joining the BRICS bloc. Analyzing Eritrea's economic and political landscape, it examines how BRICS membership could provide access to financial resources, enhanced trade opportunities, technological advancements, and diplomatic support. In Investment and development, Access to BRICS' development banks and preferential loans could bolster Eritrea's infrastructure development, particularly in crucial sectors like agriculture, mining, and energy.

In the sector of Trade, Increased trade with BRICS members, particularly China and India, could diversify Eritrea's export base, attracting foreign investment and creating jobs. In Knowledge transfer and technology: Collaboration in areas like digitalization, renewable energy, and sustainable agriculture could enhance Eritrea's technological infrastructure and bridge the digital divide. Membership may even open doors to a combined

market of over 4 billion people, providing greater access to potential customers and investors.

The paper also navigates on the potential political and diplomatic advantages Eritrea could benefit from BRICS. To list a drop from the sea: International clout: Membership in BRICS could lend Eritrea a stronger voice on the international stage, garnering support for its development agenda and potentially easing diplomatic isolation. South-South cooperation: Sharing experiences and best practices with other developing nations within BRICS could offer valuable insights for tackling Eritrea's unique challenges. Leveraging BRICS influence: Eritrea could potentially benefit from BRICS' advocacy on issues like debt relief, sanctions, and international trade rules; are also benefits which Eritrea could potentially benefit in the arena of politics and diplomacy. However, the paper also acknowledges the substantial challenges and considerations, joining the BRICS bloc, could present to Eritrea. Considering its unique economic, political, and geographical context. While conducting the overall research, the paper will consider to provide a more concrete analysis by raising specific example from the African BRICS members (i.e. South Africa and Ethiopia) and will examine their experience, for it offers valuable insights to understand the potential impact of such a move.

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## Diaspora

### Eritrean Diasporic Participation in an Age of Sanctions

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**Selam**  
**Conference Centre**  
**Day 2**  
**3:10 – 3:30**

In September 2021, through an executive order called “Imposing Sanctions on Certain Persons with Respect to the Humanitarian and Human Rights Crisis in Ethiopia,” the United States’ Office of Foreign Assets Control (OFAC) issued sanctions against Eritrea because it considered the government of Eritrea “responsible for or complicit in actions or policies that expand or extend the ongoing crisis in northern Ethiopia or obstruct a ceasefire or peace process.” Under the section “Actors Involved in Crisis in Ethiopia,” Eritrean entities that OFAC sanctioned include the government of Eritrean political party the People’s Front for Democracy and Justice (PFDJ), Eritrea’s military forces (formally known as Eritrean Defense Forces or EDF), Abraha Kassa Nemariam (the head of Eritrea’s National Security office), Hdri

Trust (the holding company of the PFDJ), Hagos Ghebrehiwet W. Kidan (the economic advisor to the PFDJ and chief officer of the Red Sea Trading Corporation, or RSTC).

Though these four entities mentioned may be the primary targets of the sanctions, the far-reaching implications of OFAC's measures has effectively levied economic sanctions on the Eritrean government. This is owing to the highly centralized nature of the Eritrean state and its employment of state-owned enterprises – Hdri and the Red Sea Trading Corporation – to conduct international business and development transactions. Consequently, OFAC's pervasive influence extends profoundly into the daily lives of Eritreans in Eritrea. With such harsh economic sanctions, the Eritrean government cannot transact with and participate in US financial systems, and it is limited in its ability to acquire US dollars for transactions. The scarcity of US dollar currency makes it difficult to engage in purchasing the medical equipment necessary to build medical infrastructure – hence the currently active participatory diaspora's opting in to crowdfund for the Eritrean state's medical equipment purchases; restrictions on the state's financial transactions also impede the ability to purchase critical medical supplies for the country. According to OFAC, entities that choose to conduct business with Hidri or RSTC will be subject to legal and/or financial consequences at the hands of the US government if

OFAC determines said entities are in violation of the sanctions. While the conflict in northern Ethiopia has since ended, the OFAC sanctions remain active and have yet to be removed by the US Treasury.

Under these still-active OFAC sanctions, Eritreans' historical tradition of community and political organizing in the United States, especially towards humanitarian goals and transnational participation in nation-building, becomes an act that has legal risks and is criminalized. In 2022, when Eritrean diasporans launched a crowdfunding initiative, "Eritrea Fights Cancer," towards purchasing cancer treatment equipment, the US-based privately-owned fundraising platform "GoFundMe" restricted the use of its services due to concerns regarding the intended destination of these funds (Eritrea, a sanctioned entity). This is one insidious way that sanctions have impacted Eritrean diasporic participation in the broader decolonial project to extend medical infrastructure-building. Through the case of Eritrea, this paper explores the long tentacles of US imperialism via sanctions, from the policy-making committees on Capitol Hill to the Horn of Africa and back into the participatory Eritrean diaspora.

Keywords: Crowdfunding Initiative, OFAC, PFDJ, Sanctions Architectural Heritage.

## The Migration Business

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**Selam  
Conference  
Centre  
Day 2  
2:50 – 3:10**



Immediately after the Lampedusa Tragedy of October 3rd 2013 when 368 people, mostly Eritreans died, some Italian politicians and the mainstream media pointed their fingers at the Eritrean government for those deaths. Since then, 30,000 African migrants have died in the same sea.

I was an activist at the time, already engaged in rebutting those media's and Italian politicians' campaigns that demonized Eritrea, through writing articles that amounted to hundreds and were published on many Italian and International websites. I began research to discover the true causes of the Tragedy. I went straight into the fields of the immigration system to conduct my fact-finding, initially working as an Italian, Tigrinya and Amharic interpreter for the migrants. I was able to penetrate the camps where asylum

seekers were kept and where journalists were prohibited from entering. I witnessed the government and private facilities where the asylum seekers were interviewed.

Through my research I found that the Italian Government was heavily responsible for the Lampedusa Tragedy and that many Italian and European entities made fortunes from the exploitation of low-cost workforces. I finally used my nine-year research and two-year infiltrated experience in the field to come up with a 404-page book titled: “Inferno Immigrazione”.

In this book I used a reversed pyramid divided into nine levels in which I place human traffickers, human rights activists, journalists, politicians, rescue ships, NGOs, UNHCR, Human Rights Watch, Amnesty International, Washington politics and the Open Society Foundation, all involved in this affair. My book created an unprecedented roar from all these districts and they tried to block its distribution through severe censorship and boycotts.

Keywords: Asylum Seekers, Lampedusa Tragedy, Mainstream Media, Migration .

# The National Public Diplomacy Group (NPDG), 2021-2024: Its Activities, Lessons Learnt, and Future Vision

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**Selam  
Conference  
Centre  
Day 2  
2:30 – 2:50**



Mr. Tesfamariam teaches at Stanford University, and works as a logistics coordinator at the Hoover Institution. He collected massive materials on the Horn of Africa. Currently, he is the coordinator of the National Public Diplomacy Group in the United States. He studied film and completed his graduate degree in Asia Pacific Studies. He also taught at the University of California, Berkeley.

The first recorded Eritrean arrived in the United States in 1924. Two other Eritreans were already in the U.S. at the time, even though their records have not been discovered. That means, in 2024, the Eritrean-Americans have been in the U.S.A. for a century. They came for a plethora of reasons and at

different times. They have contributed and continue to contribute to the social, political, economic, intellectual, and cultural progress of the U.S.

During Eritrea's fight for independence, Eritrean Americans contributed in various ways to the success of the Eritrean movement and continue to do so post-independence. One of the contributions was in public diplomacy.

At the end of 2020, the coordinated, non-stop onslaught of the Eritrean character on the U.S. media and other entities, the National Public Diplomacy Group (NPDG) was established under the auspices of the National Council of Eritrean Americans (NCEA).

March 2024 was the third anniversary since the NPDG was established. What has it accomplished, not accomplished, learned, and what is its vision are the aims of this presentation.

Keywords: Public Diplomacy, Soft Power, Technology, Networking

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# Economics and Development

## Advancing Sustainable Economic Development through Worker-Owned Cooperatives in Developing Countries

\* Petros Iyasu Demoz

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**Saloon  
Mendefera  
Day 3  
9:10 – 9:30**



Mr. Petros Iyasu Demoz got his BSc in 1977 from Addis Ababa University in Civil Engineering. He has an MSc in Construction Management from Loughborough University of Technology, United Kingdom (1990). He has extensive experience working as an Office Engineer, General Manager, a Licensed Professional Engineer and as a Retired Annuitant (RA).

Worker cooperatives have a history dating back several centuries that often-involved artisans, farmers, and other workers collaborating for mutual benefit. But the roots of modern worker cooperatives can be more di-

rectly traced to the early stages of the Industrial Revolution in the 18th century as a response to the dislocations and hardships caused by industrialization.

This study examines the potential of worker-owned cooperatives to advance sustainable economic development in developing countries by analyzing a variety of cooperatives across multiple sectors in various regions. Drawing upon existing literature and case studies, the article highlights the potential benefits of worker-owned cooperatives in promoting economic growth, generating employment, enhancing productivity, fostering sustainable development, reducing inequality, advancing social cohesion, and improving livelihoods of marginalized communities. Types of cooperatives are examined ranging from those primarily owned and managed by workers to those that evolved over time to multi-stakeholder type of cooperatives. Moreover, it is shown that by prioritizing democratic decision-making and equitable profit-sharing, worker-owned cooperatives can contribute to building more inclusive and resilient economies.

However, challenges such as limited access to capital, market competition, and restrictive regulatory environments pose substantial barriers to their expansion and effectiveness. The paper underscores the importance of supportive legal frameworks, access to financial resources, and ca-

capacity-building initiatives in enabling worker-owned cooperatives to thrive and expand.

Therefore, this paper concludes by recommending policy interventions and strategies to promote the growth and sustainability of worker-owned cooperatives as a catalyst for sustainable economic development in developing countries.

Keywords: Eritrea, Tourism Industry, Challenges and Prospects

## **Challenges and Prospects of Sustainable Tourism Industry in Eritrea: Retrospective Policy Assessment**

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**Saloon  
Dekemhare  
Day 3  
11:10 – 11:30**



Mr. Medhanie is currently working as Lecturer at Adi-Keih College of Business and Social Sciences in the Department of Business Management & Public Administration. Mr. Medhanie holds Bachelor of Art (BA) in Business Management, from College

of Business and Economics, Adi Keih, Eritrea. He also holds Master of Art (MA) in Tourist Destination Management, from Saint Petersburg State Economic University, Russia, in 2019.

The tourism industry is one of the largest and fastest-growing sectors in the global market. It contributes towards complete growth and development of a country by bringing numerous economic values & benefits and helping in build country's brand value, image & identity. Eritrea has huge tourism potential owing to its natural, historical and cultural endowments. Its potential contribution to the Eritrean economy is significant, particularly with regard to employment and alleviation of poverty. Nevertheless, several studies show that, Eritrea is unable to utilize these tourism resources and sources of tourist attractions for its socio-economic development. Hence, the purpose of the study is to investigate the current state and main directions of tourism and hospitality development and the main challenges of sustainable tourism in Eritrea.

The study used both primary and secondary data sources to answer the research questions and attain its intended objectives. Primary data were collected from semi-structured interview with key informants from the Ministry of Tourism, panel discussion of experts from different components of the tourism and hereinto-personal knowledge of researchers. Secondary data were obtained from policy documents & proclamations of Ministry of Tourism, annual reports of International Tourism organizations (UN-

WTO), magazines, articles, websites, documentaries and others. Data collected was analyzed using triangulation model with ethical consideration.

The study found that, the challenges inhibiting tourism industry development among others are; prolonged border conflict, tight monetary & fiscal policy, tight visa regime, myopic private sector, narrow tourism outlook, lack of marketing promotion and so forth. Besides, the study found that, the future prospects of the tourism industry is sanguine.

Keywords: Worker Cooperatives, General Assembly, Governing Council, Industrial Research, Cooperative Bank, Cooperative .

## **Eritrean Ethiopian Economic Cooperation: A Legal Analysis of the 1993-1998 Economic Cooperation and Paving the Way Forward Post the 2018 Peace Accord**

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**Saloon  
Mendefera  
Day 2  
10:30 – 10:50**



Ms. Lula serves as a Judge and Registrar at the Regional Court of Southern Zone, Dubarwa, a position she has held since January 1, 2024. She earned her LLB in 2023 from the College of Business and Social Sciences, Department of Law, with a focus on international law, particularly trade relations. Her professional interests include legal frameworks for economic cooperation and their broader implications for international trade and diplomacy. Passionate about reading and conducting legal research, Lula brings a nuanced perspective to issues at the intersection of law and sustainable development. Through her participation at ICES 2025, Lula aims to advance the discourse on building robust legal and policy frameworks that support political and economic relations, reflecting the broader goals of regional and global cooperation advocated by ICES 2025.

Following the referendum of Eritrea in 1993, several trade agreements focusing on trade, harmonization of economic policies, customs cooperation, industry, transportation and many other aspects including fiscal, monetary, trade and investment were signed between the government of Eritrea and the then transitional government of Ethiopia. Both countries decided to work together and to coordinate development strategies and policies of the two countries to foster economic cooperation that would eventually lead to the integration of both economies.

However, this economic integration envisaged by these various agreements never materialized. The lack of detailed agreements, weaknesses in the harmonization of their economic policies, weak institutional preparations, and the inability to control illegal trade were among the apparent reasons for the very weak implementation progress these agreements made. The introduction of Nakfa in 1997 only served to fuel the already deteriorating economic relationship between these two states.

With the start of the border war, trade activities between the two countries came to a standstill, and even after the final and binding decision delivered by the Eritrea-Ethiopia Border Commission, both countries were immersed in a two-decade stalemate. Tensions, the so called ‘no peace, no war’ situation, created a wall running between the two countries. Yet, in 2018, a new atmosphere of peace and friendship reigned over the neighboring states almost after two decades. A joint declaration of peace and friendship was declared, and both countries signed an agreement on peace, friendship and comprehensive cooperation. The declaration and the agreement, which provided for the resumption of trade activities between the two countries, went as far as considering the establishment of joint special economic zones between them.

The objective of this paper is to examine these new agreements vis-à-vis the

prewar agreements. The paper argues that although the agreement serves to pave the way for future economic ties, resuming trade without addressing the former failures would result in history repeating itself. In the past, the economic relationship, which was normally expected to unite, integrate, and render conflict expensive, played an undesirable role in the Eritrean-Ethiopian setting. Now, over two decades after the border war, if both countries are to resume trade as per the new agreements, these former failures have to be addressed first. Despite the subject of resuming trade being halted in relation to the recent political crisis in Ethiopia, it is a subject that will eventually re-emerge and remains relevant to both countries. The paper argues that unless trade agreements address the policy, legal, structural and institutional gaps existent in the prewar agreements, future economic ties with Ethiopia will continue to be thorny. Thus, the paper’s contribution will be to identify the gaps, causes of failure of the previous prewar agreements, and propose how to remedy these gaps and address the causes of the failure to ensure economic development, cooperation, and sustainable peace between the countries.

Keywords: Economic Integration, Harmonization of Policies, Institutional Preparations, No Peace No War, Trade Agreements

## Mining-induced Displacement and Resettlement: A socio-legal Analysis

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**Saloon  
Dekemhare  
Day 3  
10:50 – 11:10**



Ms. Yanet Rezene is an LL.B. graduate from College of Business and Social Sciences of Adi-Keih. She currently works in the legal service department at the Ministry of Justice. She has done her senior thesis on mining law and environmental law and has interest in researches related to such fields.

Population displacement is becoming an increasing challenge in many countries. Each year, more than 10 million people are involuntarily displaced to make way for new development projects. One cause of development induced displacement is the mining sector.

Contrary to expectations, where mining happens as a development undertaking, it often causes impoverishment of affected communities because physical displacement, relocation and resettlement pose social risks: productive system is dismantled; productive assets

or income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity is diminished or lost.

Various international financial institutions and development banks as well as international and regional conventions have addressed the issue and made efforts towards creating legal framework for the needs of the displaced people. Yet they happen to have limitations and have been criticized for such. They either face challenges in providing strategies towards relocations and resettlement that guarantee livelihood restoration, fail to safeguard human rights risks and impacts, or give little attention to the issue at hand.

The same is also true at the national level. The critical issue of providing assistance and compensation for the livelihood re-establishment of those displaced involuntarily through development is not adequately addressed in Eritrean laws. While certain laws make provision for compensation, it involves a narrow definition which does not include an obligation to restore people's well-being and ability to sustain themselves. Interviews have been conducted with experts from mining companies and stakeholder consultancies with regards the nation's resettlement practice policy. According to such interviews, experience with recent resettlement

scheme has shown difficulties and delays in proper implementation of the process causing frustration for the parties involved and increasing resettlement costs.

There is no denying that the mining sector greatly contributes to a nation's economy and presents significant opportunities for development, both in terms of the commodities produced and the socio-economic benefits that can be delivered to communities. However, there is a risk that community benefits will not be realized if the industry fails to mitigate the negative impacts that would have the effect of jeopardizing the livelihood of the affected people and their subsequent generation. Hence sustainable development – the ultimate goal - which in this case involves not only relocating and rehabilitating displaced people, but assuring that they are better off than before and that they are beneficiaries of the project that was responsible for their displacement in the first place finds itself in a huge threat.

With this picture in mind, countries and policymakers are called firstly to understand the effects of mining-induced displacement and replacement as a major issue of social justice and an area of policy and practice that requires attention; secondly, to act upon the issue and create a balance between economic development and social development needs for a sustainable future life.

Keywords: Eritrean Laws, Mining Sector, Population Displacement, Resettlement Scheme

## **The Impact of Microfinance Institutions on Improving the Livelihood of Clients: The Case of SMCP-Eritrea**

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**Saloon  
Mendefera  
Day 3  
8:30 – 8:50**



**Purpose:** Microfinance institutions supply loans, savings and other financial services to the poor and other low-income clients on a sustainable basis and play a role in the alleviation of poverty. The objective of this article is, therefore, to examine the impact of Saving and Micro-Credit Program (SMCP) in improving the livelihood of its clients. SMCP is one of two microfinance institutions active in the provision of micro loans in Eritrea.

**Design/Methodology/Approach:** The target population is all those people to whom credit is forwarded by the Saving and Micro Credit Program (SMCP). The sample has covered ben-

eficiaries from five out of six Zobas of Eritrea as SMCP has branches only in 56 out of 58 Sub-Zobas. Two-stage stratified cluster sampling method was carried out to select the 550 individual respondents. The scope of the quantitative analysis includes the use of a comparison group to define a counterfactual outcome to estimate the impact of credit on clients.

In order to accomplish this objective and compare the impact of the program on clients, three alternative approaches are used. In the first approach comparison takes place by dividing the 550 clients into senior-long time (n= 461) and new clients (n= 89). The second approach takes into consideration the amount of loan cycle a client has reached. Here we compare clients who are in the early loan cycles with clients who have reached higher loan cycles. The third and final approach compares Tier one (group organized) clients with tier two (individual) clients.

**Hypotheses and Research Questions:** Using these variables an attempt will be made to answer the following hypotheses and research questions.

**RQ1:** Does a statistically significant relationship exist between duration of cliental membership and monthly mean income of clients of SMCP?

**H0:** There is no statistically significant relationship between duration of cliental membership and monthly mean income.

**H1:** There is a statistically significant relationship between duration of cliental membership and monthly mean income.

**RQ2:** Does a statistically significant relationship exist between the amounts of loan cycle a client has reached and monthly mean income.

**H0:** There is no statistically significant relationship between the amounts of loan cycle a client has reached and monthly mean income.

**H1:** There is statistically significant relationship between the amounts of loan cycle a client has reached and monthly mean income.

**RQ3:** Does a statistically significant relationship exist between the tier type a client has reached and monthly mean income.

**H0:** There is no statistically significant relationship between a tier a client has reached and monthly mean income.

**H1:** There is no statistically significant relationship between a tier a client has reached and monthly mean income.

The data collected from clients gets analyzed through the help SPSS statistical package. A one-way Analysis of Variance (ANOVA) is used to examine whether there is a mean score difference in income between these compared SMCP groups.

**Discussion:** Ultimately following the findings the paper will provide conclu-

sion and policy recommendation.

Keywords: Cliental Membership, Financial Services, Low Income Clients, Monthly Mean Income, Saving and Micro-Credit Program,

## **Transforming Corporate Social Responsibility from Contractual Transplantation to Legislative Innovation in Eritrean Mining Industry for Sustainable Development**

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**Saloon  
Dekemhare  
Day 3  
10:30 – 10:50**

An Eritrean journal published to facilitate the then ongoing mining conference in 2014, noted that mining activities in Eritrea will offer good investment opportunities and pave way to rapid sustainable economic growth and sustainable development. The Macro-policy provides a testing clause, an economic growth be parallel to the aim of social justice and that its national development objective be the creation of a modern, technologically advanced and internationally compet-

itive economy. So, mining companies to operate in Eritrea as part of their contractual obligation are required to employ internationally accepted standards/norms of operation.

The mining companies has opted the CSR (Corporate Social Responsibility) tool as part of their corporate policies to answer to the pressure posed. Kofi Anan former UN Secretary General described CSR as universal value binding together global corporations. CSR has great potential in mitigating environmental and socio-economic challenges, such as poverty eradication and environmental degradation through integrating businesses in nations developmental activities. Because many companies are found to be well-off in technology, know-how and financial capacity. However, application of CSR is hooked on the country's understanding of the constituents of a responsible business conduct. As such, the seeming arbitrariness of government regulation and action hinder the economy will not be a problem.

The research will initially delve how responsible business conduct are currently depicted in Eritrean laws, policies, societal values and know-how. Because, CSR necessitates legal compliance as well as customary ethics. Moreover, this study will provide the framework by which the stakeholders of the operation are able to comprehend, explain, attribute, extrapolate, and predict what could happen in the future of the project. Especially, the

overshadowed stakeholders, nearby communities and diaspora to activate companies' responsible behaviour. The methodology of the study will comprise both primary and secondary data. Primary sources will include structured interviews with persons associated to each mining project; and distributing questionnaire as part of establishing a comprehensive understanding on responsible conduct. Secondary sources will include published researches and reports made as part of their CSR obligation. Case-studies will also be part of discussions to propose an effective compliance program to facilitate implementation.

Keywords: Economic Growth, Investment Opportunities, Macro-policy, Social Justice, Standards of Operation, Sustainable Development

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## Education

### Collaborative Action Research in Education: A Catalyst for Professional Development and Policy Advancement in a Demanding Context

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**Saloon  
Dekemhare  
Day 2  
8:50 – 9:10**



Mr. Amanuel works for the Ministry of Education, the State of Eritrea. Currently, he is a member of History Panel, in the Department of General Education. He received his BA degree in History Education with distinction from the University of Asmara in 2003. He taught history, geography, life skills, and civic education in three secondary schools in the country for ten years. He was a teacher educator in the currently defunct Asmara Community College of Education (ACCE) facilitating courses including introduction to pedagogy, foundations of

education, introduction to action research, and classroom research.

This study contends that the fragmentation between intentions and programs in teacher education (TE) and schools have been critically affecting the quality of practices operating within the educational landscape in Eritrea. It delves into the impact of a TE course ‘collaborative action research’ (CAR) offered to in-service teachers in their school practices.

It was informally modelled by a group of teacher educators (TEs) to enable practitioners to navigate along demanding educational contexts, make efforts to transform practices, inform and advance education policy through data-driven voices and actions. It employed a follow-up study using in-depth interviews, questionnaire for reflections, and critical observations.

It was conducted between June 2019 and January 2023 to qualitatively ensure rigour and perceptiveness of situations, illuminate why circumstances are as they are, and envisage how challenges could be transformed. The inductive examination of data rendered in this study gave rise to eight emergent themes which begets profounder implications. This study indicates CAR as a catalyst for strengthening TEs’ and school teachers’ professional relationships, developing firm engagement, and promoting legitimate and transformative practices. By offering insights into practitioners’ actions, challenges, and accomplishments, it

contributes to school practices and inspires teachers, educators, policymakers, and researchers to embrace CAR for positive transformation in education.

Key words: collaborative action research, practitioners, professional transformation and development, education policy, Eritrea.

## Developing Education through the Collaborative Interpretation of Research-Based Insights

\* Yonas Mesfun,  
Abraham Tadesse, Desalegn Zerai, Khalid Idris & Mussie Tewelde (Asmara College of Education, Eritrea)

\* Elina Lehtomäki (University of Oulu, Finland)

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**Saloon  
Dekemhare  
Day 2  
8:30 – 8:50**

Dr. Yonas Mesfun is an associate professor of language Education at Asmara College of Education. His research interests include literacy acquisition, language policy and educational interventions in the global South.

The Eritrean education system faces formidable challenges in implementing inclusive and engaging educational experiences. Research-based insights of practitioners in the field seem to have limited role in informing practice and policy in developing education. In this study, the authors address key educational challenges through a collaborative interpretation of research findings from diverse sites of educational practice in Eritrea. Through the meta-interpretation of recently published qualitative research, perspectives and collaborative interpretations, this presentation contributes research-based insights into educational practices in Eritrea and outlines key areas for further development.

The meta-interpretation of findings from 12 recent studies by the authors focuses on areas of learner-centred interactive pedagogy, language education, differentiated instruction (inclusive education), and teacher education where the gaps between policy and practice remain wide. Framed within contemporary theories of teaching, the authors uncover practices and possibilities in implementing advocated teaching approaches, linking conditions and experiences of English as a medium of education, enactments and embodiments of inclusive teaching strategies in schools, and pedagogic interventions in teacher education.

The study makes the research insights accessible to sensitise and invite communities of educational practice and policy makers to a more focused engagement with issues of education development and promote the role of practice-based research by practitioners.

Keywords: education development; collaborative meta-interpretation; educational research; Eritrea

## **Education and Social Stratification through an Informal Marketplace: Private Supplementary Tutoring and Its Policy Implications in Eritrea**

\* Tedros Sium

Mengesha: (Ministry of Education, Eritrea)

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**Selam  
Conference  
Centre  
Day 2  
10:30 – 10:50**



Dr. Tedros Sium is Senior Education Researcher and Advisor to the Minister at the Ministry of Education, Eritrea. His work experience includes a teacher at various levels of the education system, human resources development officer, teacher educator, and curriculum developer. Dr. Tedros obtained his Bachelor of Arts (Honours) from the University of Leeds (UK) in Teaching English to Speakers of Other Languages (TESOL). He holds Master's from the University of Lancaster (UK), in Developing Teacher Expertise with emphasis on Developing Countries. His PhD is from the University of Hong Kong in Comparative Education. His research interests include Education Reforms and Curriculum Transformation, English Language Teaching, International and Comparative Education, International Education Policy Studies, Shadow Education, and Teacher Education & Development. He has written several articles on education.

Private supplementary tutoring refers to fee-charging instruction and related support in academic subjects received by students outside schooling hours. It is also widely known as 'shadow education' because it mimics the official curriculum of school systems.

The education system in Eritrea emphasizes the role of education in nation-building and is linked to policies, visions, commitments and practices including social justice, self-reliance, and other values that were cultivat-

ed during the war for independence. Shadow education in Eritrea has been viewed both as a threat that creates unequal learning opportunities and exacerbating social inequalities, and as a useful intervention that complements to what teachers teach in mainstream schools. It has become visible in the country since the early years of Independence. During the past three decades, it has considerably expanded especially in Asmara and in the regional capitals and their surrounding areas. It has also increasingly attracted the attention and concern of many parents/families, students, teachers as well as education officials in the Ministry of Education. In September 2012, the Ministry issued a circular banning tutorial institutions and enterprises. Nevertheless, private tutoring continues in hidden locations, including students' homes. Some parents are investing heavily in shadow education. Yet, many parents, students, teachers and Ministry officials have contentious views on the importance and implications of private supplementary tutoring.

This paper will analyze the determinants of demand for private tutoring in Eritrea and its implications for social justice. It will explore the positive and negative dimensions of shadow education, and will provide recommendations for policy makers.

The findings draw on ongoing research which began in 2013. Conceptually, the research adopts theoretical

perspectives on social justice with emphasis on Bourdieu's cultural reproduction theory and Tilly's concept of durable inequalities. Data were collected from students, teachers, school directors, supervisors, and regional education heads through questionnaires, semi-structured interviews, and focus group discussions. Purposive sampling was utilized to obtain the sample of research participants for qualitative data. Descriptive and inferential statistics were used to analyse the quantitative data.

Keywords: Eritrea, disparities, inequalities, private supplementary tutoring; privatization, shadow education; social justice.

## **Eritrean Secondary School Students' Learning Motivation and Engagement: A Case in Zoba Maekel Region**

\* Bersabeh Daniel: (Embahara Secondary school, Asmara)

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**Saloon  
Dekemhare  
Day 2  
9:10 – 9:30**

Students' learning interest and engagement is critical in the teaching-learning process. This paper examined the tendency of secondary school students' learning motivation and engagement in classroom based academic activities in the Eritrean secondary schools. A descriptive survey research method with a mixed approach combining both qualitative and quantitative techniques was employed. Data was collected through Focus Group Discussions and using multi-scaled questionnaire.

The study involved 244 secondary school teachers and 69 student-teachers of the Asmara College of Education a total of 313 participants. The results show that the learning motivation, engagement, class participation and diligence to accomplish academic activities fall below average. The determining factors of students' learning motivation and engagement are identified from teachers' point of view. Students' mindset, lack of role models, misperception of the value of education, the curriculum and its practice are among the main factors behind. The study can serve as an empirical document to guide research-based intervention programs in response to the contemporary students' learning motivation and engagement in the Eritrean school system. The study shows critical implication for teachers, research practitioners, and policy makers in the area.

Keywords: academic engagement, learning motivation, secondary school, Eritrea.

## Factors Affecting Female Teachers' Participation in School Leadership: A Case of Mendefera Subzone

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**Selam Confer-  
ence Centre  
Day 2  
11:10 – 11:30**



Females' potential in the holistic development of schools is undeniable. Their less visibility in leadership positions in the Eritrean schools in the Mendefera subzone (region) within the Debub zone (south region) where this study was conducted is however worrying despite the presence of more than 71% of the teaching force being females.

This study aims to study why such social and educational incongruity prevails in the elementary schools in the subzone. The researcher employed mainly qualitative but also quantitative methods. He had the opportunity to collect adequate data from and around the schools from teachers, school leaders, and community mem-

bers to explore the extent of participation of females in leadership positions in elementary schools and disclose the contextual challenges using interviews (20 interviewees), focus group discussions (70 discussants in six groups), and questionnaires (89 respondents) through a combination of purposive and random sampling procedures.

The researcher used permissible and acceptable research integrities and abided by human as well as honest ways to conduct the research process. The information was organized, compared, abridged, analyzed, and related to literature reviews. The outcomes were thus important for helping the researcher to understand the attitude of the surrounding communities about female leadership, the ability and interest of female teachers to hold leadership ranks, the support and encouragement females get from the school system, the policy values and practices available in and around the schools, and essential obstacles that hinder female teachers from coming to leadership positions.

The study suggested the need for more detailed studies in each elementary school community for specifically encouraging female teachers to hold leadership positions considering females' professional merit in the schools.

Key words: Female teachers; leadership; elementary school; Eritrea..

## Reframing Contents for Educating Teachers: Pursuits for Professional Engagements

\*  
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**Selam  
Conference  
Centre  
Day 2  
10:50 – 11:10**

Dr. Berhane Demoz is educator and senior researcher. He has extensive experience in educational planning, education statistics, pedagogical approaches & practices, and curriculum planning. He has worked on education projects and programmes for thirty years. His research interests include: teacher education, professional integrity in teaching and collaborative action research.

Teacher education in Eritrea dates back to the early 1940s. Yet, its history and its impact to the quality of school education will require professionally thoughtful, collaborative, and sustainable engagements in research. This should penetratingly mean to strategically and practically improve teacher

education in general and initial teacher education in particular with great attention to kindergarten and primary school education.

The justification is that these levels greatly decide the quality of education of the ensuing higher levels of formal education in laying the footings mainly for nurturing conscious and responsible citizens. Currently, the demand for weaving teacher education into the ‘tapestry’ (Cochran-Smith, 2000, p. 2, emphasis added) of diverse political, social, economic, and educational situations of the country has never been as urgent. In fact, no country will probably require high quality school system guided by unfaltering teachers (Ministry of Education, 2008) considering the country’s targeted political victimization by the west and actively served by the consecutive Ethiopian regimes. In line, Musset (2010) argued that any education reform that does not take serious consideration about the indispensability of teacher education is predestined to gross failures.

This article is an extract of one chapter among the 13 chapters of a manuscript recently finished by the writer’s reflective engagements and literature reviews entitled Professional Pursuits for Educating Teachers: Managing Complexity with Complexity. It was developed during the last 18 months that demanded thorough reflections of about four decades of his experience in teacher education. The article focuses on the pressing needs that education-

al establishments and their partners are required to rethink and reframe in developing historically vital, educationally grounded, and resourcefully relevant initial teacher education contents (often termed as curricula) in the country. The outcomes of the process brought to bear that contents for educating reliable teachers must be grounded on school programs as implied by the educational needs of school learners, and on the pedagogy that should closely accompany school programs as revealed by pertinent culture, professional character (identity), and core areas of knowledge. “As coloniality has been a systematic project of removal, a pedagogy of and towards decoloniality must also be our project of “RE”: resisting, refusing, rehumanizing, restoring, reimagining, etc.” (Reyes, 2022, p. 1244) our teacher education programs.

Key words: Initial teacher education, quality of education, school programs, pedagogy, culture, character, contents, Eritrea.

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## Environment & Climate Change

### Assessing Forest Cover Changes of Eritrea: An Overview

\* Woldetsae      Tewolde  
(College of Business and Social Sciences, Adi-Keih)

**Saloon**  
**Massawa**  
**Day 1**  
**5:00 – 5:20**

Dr. Woldetsae is Associate Professor at Adi-Keih College of Business and Social Sciences with the Department of Geography, Eritrea. He received both a Bachelor of Arts (1988) and a Master of Arts in geography (1995) from Addis Ababa University. In 1998, he was awarded a Fulbright scholarship to pursue a Ph.D. in the United States. In August 2002, he completed a Doctor of Philosophy in Human Ecology at Louisiana State University. His research interests include pastoralism, land degradation and the Horn of Africa.

Eritrea has suffered from an intense degree of deforestation, due, mainly, to long-term climate changes, and human factors such as excessive use of fuel wood and agricultural expansion. Behind the direct causes of deforesta-

tion process, there are other more deeply rooted drivers that have to do with poor infrastructure, inadequate human capacity and weak institutional framework.

In Eritrea, indiscriminate cutting of trees had been taking place throughout the country, but it is widely manifested in the central highlands and southern plateau. Given the current population growth rate and land-use system extreme pressure on the forest cover of the country is expected in the future, which entails the need for a rational utilization of land resources.

This research paper aims to provide fresh outlook at the changes that took place in the forest landscape of Eritrea since the late eighteenth century. It analyzes the body of literature that challenges much of the current mainstream thinking about the scale and extent of deforestation in the country. In order to draw a fairly detailed picture of the study, the author has tracked down as much information as possible.

To this effect, data for the research were gathered through reviewing government and non-government documents and through carrying out discussion with key informants in some selected sites. Moreover, the study has made use of archival and photographic evidence from a number of earlier Italian botanists, who played crucial role in identifying the vegetation types and in reporting the changes that took place over time. The result from this empirical research is expected to pro-

vide an overview on the dynamism of the country's forest cover and the circumstances that contributed to the process of tree clearing. Further, the study, despite limited in scope, is hoped to serve as a basis for further in-depth research on the forest cover of Eritrea.

Key words: Eritrea, deforestation, sustainable land management

## **Exploring Rainfall Variability and its Impact on Early Crop Development in Eritrea: A CHIRPS-v2 and MODIS NDVI based Analysis (2015-2023)**

\* Mebrahtom Zerom  
Gebreyesus (College of Business and Social Sciences, Adi-Keih, Eritrea)

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**Saloon Nakfa**  
**Day 2**  
**5:00 – 5:30**

Mr. Mebrahtom is PhD Student at School of Geographical Sciences, Northeast Normal University, China.

Monitoring the variability of the rainy season is a critical requirement to adapt climatic change and variability. The summer rainy season commonly begins in mid-June in most highland

areas, and the growth of short-cycle crops and herbaceous cover depends on the onset of summer rain. However, variability on the start of rainfall and dry spells can significantly affect their development. Therefore, this study aims to analyze the variability and trends at the start of the rainy season between 2015 and 2023 and its impact on early crop and herbaceous cover development.

The analysis will use CHIRPS-v2 satellite rainfall data and MODIS NDVI data to examine rainfall and NDVI variability on a dekadal (10 days) basis, from the second dekad of June to July. It will also assess rainfall and NDVI anomalies using statistical techniques by administrative regions (Zoba). Precipitation delay and variability significantly affect the crop season and overall vegetation. Thus, lowest NDVI values will be identified, when fields are ploughed at the very beginning of the rainy season, and in areas where the crop season is delayed. The study's results will provide valuable insights into the impact of rainfall variability on crop development, aiding in the development of effective adaptation strategies.

**Key words:** Eritrea, Remote Sensing, Rainfall variability, NDVI, dekad, Crop development.

## **Incidence of Fish Mass Mortality in the Southern Red Sea, Eritrea**

\* Teklehaimanot Beraki, Habtom Mussie and Hilal Girmay (Ministry of Marine Resources, Research Division)

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**Saloon  
Akurdet  
Day 2  
10:30 – 10:50**



Mr. Teklehaimanot Beraki has a B.Sc in Applied Marine Science from College of Marine Science and Technology, Eritrea. In 2020, he graduated with M.Sc in Aquatic Bioresource Management from Kaliningrad State Technical University, Russian Federation. Currently, he is working as a researcher and acting director of Marine Resources and Environment Research Division, in the Ministry of Marine Resources, Eritrea.is

The incidence of fish mass mortality happened in the Eritrean Red Sea waters during the hot season from the month of July to August 2023. During this time different species of fish died and splashed out to the coast of islands and main lands. Field trip along the coast of Massawa and Sheik Seid Island, focal group discussion and inter-

view with the fishermen were conducted to investigate the probable cause of fish mass mortality. The interview with thirty six fishermen (25 from artisanal and 11 from semi-industrial) was carried out at Gbi landing site, Massawa fish Port while focal group discussion was done in Assab.

The fishermen were interviewed separately in order to avoid influences among each other in their responses. Out of the total respondents, 83.3% observed that different species of fish died and drifted to the coast as well as remained float in the sea water. The dead fish were seen in different coast such as Desie, Durgela, Gebiho, Nakura, Derdea, Seleit, Dahlak, Massawa and Assab. According the respondents, the sea was very calm, hot, and almost reddish in color due to algal bloom. The respondents further noted that the fishes were sluggish and exhausted prior to death.

Fishes that live in confined areas such groupers, snappers, emperors, puffer fish, parrotfish and sting rays; and those fishes that reside on the surface such as, queen fish, jack fish, were among the most affected species during the fish mass mortality event. The respondents reported that the probable cause of fish mortality could be increase temperature and algal bloom.

The study concluded that combination of algal bloom, increase temperature and depletion of oxygen could be the probable cause of the mortality.

This preliminary study recommended continuous monitoring of physical and chemical parameters of the sea to track and mitigate the environmental changes and its consequences

Key words: Eritrea, fish, Mortality, Red Sea, Algal bloom.

## **Innovative Applications of Recycled Construction and Demolition Waste**

\* Michael Tekle

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**Saloon  
Akurdet  
Day 2**

**11:10 – 11:30**

Introduction: Rapid urbanization and mining sector in Eritrea is driving construction activity, leading to increased Construction and Demolition (C&D) waste. Traditional disposal methods strain landfills and raise environmental concerns. This paper explores how innovative applications of recycled C&D waste can promote resource efficiency and sustainable development in Eritrea's construction sector.

Methodology: This paper examines the feasibility of utilizing recycled C&D waste in prefabricated elements

and green infrastructure projects within the Eritrean context. It analyzes existing literature and explores potential applications suitable for local conditions and resource availability.

**Focus on Eritrea:** The paper acknowledges the specific challenges and opportunities present in Eritrea, including:

- Limited access to virgin construction materials in certain regions
- Growing demand for affordable and sustainable housing solutions
- The potential for job creation within the C&D waste recycling sector

**Proposed Applications:** The paper identifies innovative applications of recycled C&D waste particularly relevant to Eritrea, such as:

- Prefabricated construction elements for schools, clinics, and low-cost housing projects, utilizing recycled aggregates in prefabricated concrete components.
- Green infrastructure projects for urban storm water management and flood control, incorporating recycled C&D materials in permeable pavements or bioretention systems.

**Benefits:** The paper emphasizes the potential benefits for Eritrea's construction industry, including:

- Reduced dependence on virgin resources and import costs
- Increased project sustainability and environmental benefits
- Improved waste management

practices and reduced landfill burden

**Challenges and Recommendations:** The paper acknowledges potential challenges, such as:

- Limited infrastructure for C&D waste processing and sorting
- Need for capacity building and awareness raising among stakeholders

**Conclusion:** The paper proposes recommendations for overcoming these challenges, including:

- Investment in C&D waste processing facilities and training programs
- Developing clear regulations and quality standards for recycled C&D materials in Eritrea

By promoting innovative applications of recycled C&D waste, Eritrea can achieve a more sustainable and resource-efficient construction sector, contributing to the nation's overall development goals.

**Key words:** recycled C&D waste, prefabricated elements, green infrastructure, sustainable construction, circular economy, Eritrea

# **Mass Coral Bleaching Associated with Decrease in Fish Abundance in the Coral Reefs around Massawa in the Summer of 2023**

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\* Hagos Zerom & Yohannes Teklemariam: Ministry of Marine Resources, Massawa, Eritrea

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**Saloon  
Akurdet  
Day 2  
10:50 – 11:10**

Since the late 1990s massive coral reef bleaching, caused by climate-induced ocean warming, have occurred almost annually in many reefs along the Eritrean coast of the Red Sea. During these years the bleaching was followed by full recovery in few months' time. During the summer of 2023 widespread coral bleaching was observed over the Eritrean coast of the Red Sea. This time, however, the corals seem to have been affected beyond recovery. Six months after the bleaching event, the corals remain dead and most of

them are covered by algae.

In this paper we present an analysis of recent summer bleaching of corals from three reefs around Massawa. Results from the study show that the coral bleaching caused mass coral death in Resi-Mdri, Twalot and Sheik Siad reefs. The death of the corals caused drastic decrease in fish populations in the three sites. In Resi-Mdri and Sheik Said only herbivorous fishes remain, as the reef was totally devastated, leaving dead corals to be covered by turf algae. In Twalot reef, however, there is higher diversity of benthic fauna including sponges, crustose coralline algae and remnants of live corals. The assemblage of fish in the reefs reflect their feeding habits. Whereas Resi-Mdri and Sheik Said reefs have low fish species diversity, which is dominated by surgeon fishes. Twalot reef has relatively high diversity of fishes including parrotfishes and butterflyfishes, which are known to feed on sponges and corals respectively.

Results from this study raised concerns that global warming may have crossed a critical threshold causing thermal stress to corals and to the other organisms that depend on them.

Key words: coral reef bleaching, global warming, ocean warming, Red Sea, reefs.

# Overview of Climate Change Impact and Climate Resilient Water Supply and Water Resources Management of Eritrea

\* Dawit Berhane Hagos: Ministry of Land, Water and Environment

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**Saloon  
Akurdet  
Day 1  
3:30 – 4:00**



Mr. Dawit Berhane Mr. Dawit Berhane has a BSc and an MSc in Plant Protection from Hamelmalo Agricultural College (HAC). Since 2016, he has been teaching entomology related courses. Currently, he is pursuing his PhD in Entomology at the Hungarian University of Agriculture and Life Sciences. So far, he has published nine articles in international journals, with more underway.

Trend analysis of observed climatic data (surface temperature, precipitation, groundwater table, water quality and stream flow) on selected sites was performed to detect the current

climate variability and impact on the water supply and water resources systems of Eritrea. The assessment shows an increase in the surface temperature, changing precipitation patterns, variability, and decreasing of water table and stream flow and degrading of groundwater quality in recent years.

The variability of surface temperature and average annual precipitation which are the main indicators of climate change were validated against the finding of the AR5 of the IPCC and shows a good agreement. The assessment reveals there is a rise in surface temperature and changing precipitation patterns and is considered irrefutable evidence of climate change. This has already started to have serious consequences for the current water resources and water supply system of Eritrea and will have even more dire consequences in the future. Therefore, the present and future planning of adequate and safe water resources and water supply systems in Eritrea should be set in the context of growing uncertainties arising from the implications of climate variability and future changes. This could be addressed by reviewing, refining and streamlining of the existing and newly developed adaptation strategies by different institutions, towards climate-resilient water supply and water resources management for Eritrea.

Key words: Climate Change, Water Supply and Resources Systems, Resilience, Adaptation.

## **Sacred Sites as Sanctuaries to Biodiversity Conservation: Peoples Attitude and Percep- tions in Debresina Monastery**

\* Gebreyesus Wel-  
day: Ministry of Education,  
Adi-Keih)

\*Woldeslassie Ogbazghi & Geb-  
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### **Saloon Nakfa**

#### **Day 2**

**5:30 – 6:00**

Eritrea is endowed with plant biodiversity. Due to human induced and natural calamities, the vegetation cover has dwindled; and the remnata plant cover is limited to inaccessible sites to human and domestic animals; and to some extent, in sacred sanctuaries such as monasteries and sacred water points where social barriers contributed towards their conservation.

In this connection, a study was carried out in Debri -Sina. The objectives of the study were to investigate the contribution of the monastery in biodiversity conservation; and document the local peoples' attitude towards the biodiversity; assess their perception

and contribution towards the conservation and protection of biodiversity in and around the sanctuary. In this study, socioeconomic survey, focused group discussion with key informants; and interviews were carried out using group discussions and structured individual questionnaires and discussion were carried out with key informants from the village community and the chief clergies of the monastery; and Extension workers of the ministry of agriculture.

The results show that there is positive attitude towards the indigenous area enclosures and the monastery. Invariably local communities understand the role of the sacred sanctuary in the conservation of biodiversity in general and useful trees and shrubs in particular. From this study, can be concluded that the monastery indeed plays a vital role not only in the preservation of the vegetation at large but also sets a model towards sustainable utilisation of plant resources. It is recommended to carefully analyse the traditional conservation methods and expand the practices in other areas of Eritrea where there is dire need for the preservation of biodiversity in the area and beyond.

Key terms: conservation, sacred sites, enclosures, socioeconomic survey, Debresina monastery.

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## History

### Alemseged Tesfai: The Writer as a Historical Subject

\* Tej N Dhar,  
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**Selam  
Conference  
Centre  
Day 3  
10:30 – 11:00**



Tej N Dhar, Professor of English, Shoolini University, has held teaching positions and research fellowships in Universities in India, the United States, and Eritrea. He has edited fourteen books, published two novels, over fifty critical essays, and four hundred and fifty creative pieces and book reviews in national and international journals. His most recent publication is *Routledge Encyclopedia of Indian Writing in English* (2024), coedited with Manju Jaidka.

Alemseged Tesfai is a writer of distinction whose writings are distinguishable from those of a host of other writers who wrote to expose the falsi-

ties the colonials perpetrated to justify their presence in the colonies and even pressurized the colonial subjects to internalize them.

A brief mention of such writings from Asia and Africa provides an appropriate context for understanding and assessing the contribution of Tesfai in the anticolonial struggle of Eritrea, which is the main theme of the essay. It argues that he is one of the very few writers who, almost in the manner of Frantz Fanon, not only wrote to the empire long before such writings were made visible by *The Empire Writes Back*, but, like a true historical subject, also fought the empire, and inspired his countrymen and countrywomen to do that because of a belief rooted in the cultural ethos of Africa/Eritrea. It also shows how this has affected the nature and texture of his writings in different genres written in his native language Tigrinya and translated by him into English in a volume entitled *Two Weeks in the Trenches*.

Key terms: anticolonial struggle, Eritrean writings, historical subject; postcolonialism, revolution.

## **An African Peoples' Quest for Freedom and Justice**

\* Memhir Alemseghed Tesfai (Research and Development Centre, Eritrea)

**Selam Conference Centre**  
**Day 3**  
**4:40 – 5:00**

Alemseged Tesfai is a renowned Eritrean writer and historian. He has authored several war diaries, short stories, plays and books. His drama 'The Other War', was the first Eritrean play ever published, and the first to be translated into English. He earned his bachelor's and master's degrees in law from the then Haile Sellassie University in Addis Ababa and the University of Illinois at Urbana-Champaign, USA, in 1969 and 1972, respectively. He pursued a doctorate degree at the University of Wisconsin-Madison, USA, completed all course requirements, and went back to Eritrea and Ethiopia to collect data for his dissertation. Instead of coming back to Wisconsin to complete his doctoral studies, he made the selfless decision to join the Eritrean armed struggle for independence. By all accounts, Memhir Alemseged has the level of academic capabilities needed to make him a competent scholar.

## **Colonial and Post-colonial Archives in Eritrea: The "Archivio Ascari"**

\* Rediet Kifle Taddese (Università di Pavia, Italy)

\* Massimo Zaccaria (Università di Pavia, Italy)

\* Corresponding author: massimo.zaccaria@unipv.it

**Saloon Akurdet**  
**Day 2**  
**9:10 – 9:30**



Massimo Zaccaria is Associate Professor of African Studies at the Department of Political and Social Sciences at the University of Pavia (Italy). He teaches courses on the history of Islam in Africa, Indian Ocean studies, and the history of Italian colonialism. Zaccaria holds a degree in Oriental Languages from the University of Venice Ca' Foscari. He holds a PhD in African History from the University of Siena. He was a Marie Curie Fellow from 2009 to 2011. He has extensive field experience in the Horn of Africa, with regular research visits to Eritrea and Ethiopia. His main research interests include Eritrea's colonial social and economic history, Islam and Italian colonialism,

the history of writing and reading in the Horn, and migration in contemporary Africa. Zaccaria's publications in these fields include articles in journals such as *Aethiopia*, *The Journal of Imperial and Commonwealth History*, *International Labor and Working-Class History*, and *The Journal of North Africa Studies*. He has recently published the book *Missions Abyssines. L'Étiopia, la Grande guerra e la Conferenza della pace* (Roma 2024).

Africa is usually thought of as a continent where most of the colonial archives have been removed, returned to the colonial metropolises or simply destroyed. Between 1941 and 1943, following the defeat in the Second World War, Italy lost possession of Eritrea, Somalia and Libya, and there was no time to migrate the archives, while massive destruction of documents did not occur. It was only in 1951, after lengthy negotiations with the British authorities, that Italy was able to transfer to Rome an important collection of documents and books, known as the "Archivio Eritrea". But there are still many colonial archives in Eritrea, both public and private, which can help us to explore new aspects and significantly change our understanding of the Eritrean past.

A good example of such archives is the "Archivio Ascari", which was collected during the post-colonial period, and is currently stored in the Eritrean Research and Documentation Center (RDC) in Asmara. It was a result of the work collection by the distinguished

figure in the Eritrean history, Brother Ezio Tonini (1939-2016) who found the Pavonian Center. In the 1930s there were more than 60,000 Askaris out of a population of 660,000 and Eritrea was a highly militarised country, and the importance of this archive to this section of the population cannot be overstated. Preliminary analysis on sample documents from the archive shows that there are substantial amounts of personal profiles of individual Askaris. Upon thorough inventory and digitization efforts this research intends to investigate this content to do demographical, and historical analysis, which could be a great input for current and future historians to join the effort of mining the "grain".

Key terms: Africa, Archivio Ascari, Archivio Eritrea, Askaris, colonial archives

## **Customary Power and the Making of Local State in Early Colonial Eritrea**

\* Salahadin Ali (Makerere Institute of Social Research, Uganda; Research and Documentation Center, Eritrea)

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**Saloon  
Massawa  
Day 3  
2:30 – 3:00**

Like other colonial projects in the rest of Africa, one of the early political undertakings of Italian colonialism in Eritrea was to incorporate precolonial structures of power that previously belonged to the society into the colonial state machinery. However, the process of incorporating ‘customary’ authorities was not an act of straightforward integration. It was rather part of a complex project of colonial state formation with its own epistemological and institutional dimensions. To that end, following their European colonial counterparts elsewhere, Italian anthropologists and administrators undertook extensive studies throughout the country and produced volumi-

nous ethnographical monographs on society, custom and power in Eritrea. The colonial officers used these ethnographic and biographical studies not only to identify who had a ‘true’ claim to a particular office but also to determine if certain authorities and/or certain local power structure would serve for the stability of colonial rule. Relatedly, the practical/institutional dimension of the project involved various administrative acts that delimited and redefined politico-Juridical sphere of ‘customary’ power.

Based on close and critical examination of relevant colonial archives on the subject, the paper attempts to show that this early colonial project of incorporation and reconfiguration of local power structures had far-reaching implications in the colonial and postcolonial state formation in Eritrea.

Key terms: Custom, customary power, colonialism, state formation .

## History of the Eritrean Armed Struggle

\* Zemhret Yohannes  
(Head of Research and Documentation Centre, PFDJ)

**Selam  
Conference  
Centre  
Day 3  
4:20 – 4:40**

## Milestone in the History of Islam in Eritrea

\* Ismail Mokhtar (USA)

**Selam Confer-  
ence Centre  
Day 3  
5:00 – 5:20**

## Political Agency and Governance of Ethnic Diversity in Late Nineteenth-century Eritrea

\* Olindo De Napoli  
(University of Naples Federico II)

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**Saloon Nakfa  
Day 2  
2:30 – 3:00**



Dr. Olindo is Associate Professor of Modern History at the Department of Social Sciences of The University of Naples Federico II. PhD in Analysis and Interpretation of European Societies (2008) and in History of Law (2013), he has received fellowships from various research institutes, among which the Institute for Advanced Study – Princeton (2014-2015), and has been visiting scholar at European Institute, Columbia University (2013) and Universidad de Huelva (2018). De Napoli is currently a member of the board of the PhD in Global History and Law, at the Scuola Superiore Meridionale ([www.ssmeridionale.it](http://www.ssmeridionale.it)) and Principal Investigator of the project “Imperial Entanglements: Latecomer Colonial

Empires and the Politics of Comparison (1880s-1940s)” (www.imperialentanglements.it). His main research interests focus on the history of colonialism, citizenship, criminal law, and racism. His latest book is a history of deportation in Nineteenth-century Italy (Laterza, forthcoming 2024).

The paper tackles the problem of the “ethnic” governance of Eritrea in colonial times under Italian domination. The European travelers and scholars who analyzed Eritrea used to describe the country as an “ethnic mosaic.” The colonial government was faced with the problem of establishing its authority on a complex territory where different groups existed, provided with different religions, legal and political systems, and economic organizations. The presentation delves into some letters written by Eritrean chiefs to the colonial administration in the late Nineteenth century. Various Eritrean leaders and notables tried to use the colonial power to reinforce their authority, obtain subsidies or weapons, help resolve internal or external controversies, and more. The letters analyzed here represent the first written texts from the Eritrean society. They show both the attempt to resist colonial power by limiting its authority and the will to explore all the possible ways to exploit colonial resources. The presentation will show the autonomy and agency of the various groups before the colonial power.

Key words: contemporary history, governance, multi-ethnic society, agency

## Reflection of Cultural Identity in Hailu’s “The Conscript”: A Postcolonial Perspective

\* Desbele Teckle Tesfariam (College of Business and Social Sciences – Adikieh)

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**Saloon  
Akurdet  
Day 3  
8:30 – 9:00**



Mr. Desbele Teckle is a lecturer at the College of Business and Social Sciences (CBSS). He has BA in Literature. In 2023, he completed his postgraduate studies in India. So far, he has published three articles in international journals. He has also translated a Bhutia oral tale into English. He is also about to publish three creative works across different literary genres, including a collection of poetry, a collection of short stories, and a novella.

This article delves into the intricate exploration of cultural identity within the lesser-known Eritrean postcolonial work, *The Conscript*, penned by Hailu. Rooted in the complexities of postcolonial literature, the study examines how

the characters' experiences reflect the multifaceted nature of cultural identity, both shaped by historical context and challenged by external influences.

Through an analysis of characters' emotional responses, artistic expressions, and negotiation of loyalty, the article uncovers the interplay between Eritrea's colonial past, tussle for freedom, and the characters' perceptions of self.

The study contributes to the broader discourse on postcolonial literature by shedding light on the voices of the marginalized and highlighting the significance of lesser-known narratives in portraying the intricate cultural identity. Ultimately, The Conscript serves as a compelling lens through which to explore the enduring power of literature in dissecting the complexities of cultural identity in postcolonial settings.

Key words: cultural identity, grief, regret, artistic expression, marginalized voices, loss and resilience, identity negotiation, loyalty and dislocation

## Sahaba: The First Muslim Emigration to the Horn of Africa

\* Tajedin Nuradiam

**Saloon  
Massawa  
Day 3  
2:00 – 2:30**



The mission of profit Mohamed was 610 AD.

\* The immigration To Abyssinia -The fifth year of the mission year.

The Prophet's migration from Mecca to Medina at the beginning of the Hijri calendar the year 14 for the missionary - 622 AD

The Isra and Miraj and the beginning of prayers were in 621 AD in the twelfth or thirteenth year of the mission. The age of the profit was 53 years. Part of the pray (sojod) was known to the Arabs before Islam and the sahaba return to Mecca on the fifth year of the mission, and it is not known in which direction they prostrated

Date of birth and death of Al-Najashi. He was born in 560 AD and died in October 630 AD.

Date of birth and death of Ahmed

Grae. Born in 1506 and died in 1543 AD on age of 37years old.

History of the establishment of Islamic-style kingdoms in eastern Ethiopia, eighth century - ofat ( jebert) - Dwaru - Arabini - hadia - sharha - Bali - Dara.

Ofat is Jabart - Al-Qalqashandi - Subh Al-A'sha 326 H 5.

Who are the companions ( sahaba)?

What are the reasons for migration?

Why was the migration to Abyssinia?

The Companions (Sahaba are the followers of the prophet Muhammad and they are a few who believed in the new religion - Islam, whose message appeared in the year 610.

What was their destination, where did they land, and how many were they?

The reasons for the migration of the Sahaba was the torturing and oppression that the followers of the new religion faced from the Quraysh and the tribes allied with them.

The immigration was in the fifth year of the mission and in the period between (Rajab, Sha'ban and Ramadan, (6-615 AD), and this date corresponds to the rainy season on the area.

The number of the sahaba is not clearly known - between ten men and four women and eleven men and four women.

## State Archives: National collective Memory and its Importance for Nation Building

\* Azeb Tewolde (Director, Research and Documentation Center - RDC)

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**Saloon Akur-det**  
**Day 2**  
**8:50 - 9:10**



Politically and technically, the production, conservation and transmission of archival documents from one generation to another is one way of reproducing collective national memory, a foundation for national cultural identity. Eritrea had gone through consecutive European and non-European colonizers including cruel Ethiopia occupation together for almost three centuries. Throughout this centuries, the Eritrea society had resisted them initially through spontaneous and disorganized ways which later evolved to a very sophisticated and highly organized political and armed struggles. During the resistance and struggles, the Eritrea people established rich common history with strong national-

ist values and mores characterized by the principles of self-reliance and unity in diversity unparalleled by any other African experiences.

However, these historical facts have not met international visibility. Most of the published books and journal articles written by foreign researchers, academics etc. consciously and unconsciously were part of the colonial instruments and narrated the Eritrean history to serve the colonial interests. Both to ensure the transmission of the hard-won national values and principle, and to give the Eritrean history right narrative in the international stage require the formation of robust national archival institutions. The efforts done so far to make a foundation for the national archive is commendable, but the task remains daunting. One major solution that could solve the challenge is to consider the establishment of national archive as part of nation-state building process. Knowing that these historical assets are important stepping stones in the national building process of Eritrea, the continuity of the Eritrean nationalism depends on the continuity of transferring them to the next generation.

Using this research theme as an objective, the paper analyses the importance of archive in nation building process by raising questions such as: what is the role of achieve in nation building process and why should it be an integral part of modern state building? how do we build collective memory and drive peaceful state-building

process? In answering these questions, the paper will provide an analysis of current state of public archives visa-avis their importance as a reference for nation building and Eritrean historians as well as writers. At the end it will offer a range of suggestions and recommendations that help way forward in establishing national archive.

Key words: archival documents, colonial instruments, national cultural identity, national memory, cultural identity

## **The Business of Statecraft: The Diplomacy of Oil Concessions during the Eritrea-Ethiopia Federation, c. 1952-1962**

\* Luca Puddu (University of Palermo)

**Saloon Nakfa**  
**Day 1**  
**5:00 – 5:20**



The presentation proposal explores the role of foreign business groups in shaping the diplomatic engagement between African powers and the international system from a historical perspective, with a specific look at the diplomacy of oil concessions in Eritrea during the federation with Ethiopia (1952-1962).

The presentation is focused on the negotiations (1952-1958) between the Italian oil company AGIP, the American oil company Sinclair Oil, the Eritrean administration, and the Ethiopian imperial government for the assignment of oil exploration rights in Eritrea after the end of the British occupation. The dispute between international oil companies and the Italian government's determination to protect the interests of Italian business groups in the former colonial space overlapped with the confrontation between Asmara and Addis Ababa over the distribution of institutional prerogatives in the realm of foreign policy and economic governance under the federal arrangement.

Historical business records offer an innovative entry point to the hidden power struggles that took place at the nodal points between the national and the international system in the African continent of the second half of the twentieth century, providing fresh knowledge on the relevance of business diplomacy in shaping the quest for statecraft in the Horn of Africa. From a methodological standpoint, the presentation is based on primary sources from the historical business records of AGIP and UNICREDIT, the Ethiopian national archives, and the archives of the Italian Ministry of Foreign Affairs.

Key words: AGIP, diplomatic engagement, diplomacy of oil concessions, foreign business, statecraft, UNICREDIT.

## The challenge of preserving Gə'əz manuscripts in Eritrea

\* Kiflom Michael Kahsay  
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**Saloon Nakfa**  
**Day 2**  
**11:30 – 11:50**



Mr. Kiflom Michael Kahsay is President of Library and Information Association and Director of Rora Digital Library. He holds MSc in Information Technology from University of Pretoria, South Africa. He also holds Masters of Arts in Sustainable Development. He attended several International Conferences and presented papers that include IFAP by UNESCO and International Open Repository. He published papers in Eritrean Journal of Review Studies. He published two editorial books.

Eritrea is rich with ancient manuscripts written with its own script known "Geez". The script is an earliest one commonly found at both Eritrea and Ethiopia. Geez could only be

read by few people at monasteries and churches. Today, these materials are far from rich of the common society and scholars with the exception of few monks and priests. Due to continuous use and handling, the age and intellectual contents of these materials are highly at risk. In unpublished preliminary study conducted by the Eritrean Research Documentation Centre (RDC) reveals that there are around 6042 registered manuscripts. However, all the interviewees confirm that the number of manuscripts would go beyond 20,000 if a holistic inventory is undertaken across the country. Yet, the country is unable to conduct a comprehensive and conclusive inventory of manuscripts and as a consequence, it became impossible to understand the extent and intellectual content of Geez manuscripts.

These realities became among the other reasons for not taking a serious conservation and preservation work on the ground and far more hindered the accessibility of these materials for scholarship. The purpose of this research was to suggest possible ways on how to preserve and prepare these collections ready for digitization and accessibility. To address the problem, the researcher employed a qualitative research methodology, documents literature and an interview with experts and scholars as methods of data collection and identifying topics that would serve as thematic analysis. The findings revealed that there are no binding legal archival documents, rules and proce-

dures between all parties engaged on the issue of Geez manuscripts and unwillingness of all the monasteries and churches to submit their manuscripts for digitization for various reasons.

Key words: Geez manuscript, Geez manuscripts inventory, Eritrean monasteries and churches, Conservation of manuscripts

## **The Depoliticization of Dissent: The Italian Gaze on “banditry” in Early Colonial Eritrea**

\* Francesca Custodi (University of Pisa)

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**Saloon Nakfa**  
**Day 2**  
**3:00 – 3:30**

Ms. Francesca Custodi is a Ph.D. candidate in contemporary history at the University of Pisa (Italy). Her research delves into the motivations of individuals who broke the law in colonial Eritrea, challenging the characterization of their actions as mere banditry. Her research explores the discourses and memories regarding the individuals who were referred to as “ribelli” (rebels) and/or “briganti” (bandits) by the

Italian colonial authorities in Eritrea, in the first years after the establishment of the colony.

The colonial documents at the Archivio Storico Diplomatico of the Italian Ministry of Foreign Affairs contain numerous accounts of “acts of banditry and brigandage”, in the early years of colonial Eritrea. Many of these acts were felonies against Italian settlers, prisons and companies, thus challenging Italian authority. Despite their apparent improvisation and lack of coordination, the significant frequency and widespread nature of these actions presented a serious threat to the colonial administration, which responded with a resolute determination to stamp out banditry. But who exactly were these bandits?

Drawing from Nathan J. Brown’s study on banditry in modern Egypt (1990), this study shifts the focus from ‘What did the bandits do?’ to ‘When and why do we know what the bandits did?’. Consequently, it critically assesses the representation of banditry by Italian colonial authorities and its instrumental use in the construction of state identity.

In order to do so empirically, this article examines the correspondences within the colonial administration, in the early years from the establishment of the colony (1890-1905), inquiring into the gaze of the Italian authority regarding the phenomenon of Eritrean banditry. As the study will disclose, much as there are discordant views on

banditry among colonial authorities, concerning for example the granting of perdono (pardon) to the rebels, they all converge in portraying the bandits as criminals devoid of any political dimension. Any alternative portrayal would indeed have undermined the colonial discourse and the legitimacy efforts of the colonial power.

Key words: banditry, brigandage, colonial administration, Eritrea, Nathan J. Brown’s study.

## The First Tigrinya Periodicals and the Dissemination of Literacy in Eritrea (1909-1917)

\* Natnael Aron Ghebrehiwet (Research and Documentation Center, Asmara)

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**Saloon  
Akurdet  
Day 2  
8:30 – 9:00**

Dr. Massimo Zaccaria is Associate Professor in African History at the Department of Political and Social Sciences at the University of Pavia (Italy). His principal areas of research cover the social and economic history of Eritrea during the colonial period, Islam

and Italian colonialism, the history of writing and reading in the Horn of Africa. In these fields, Zaccaria's publications include articles published in journals such as *Aethiopica*, *The Journal of Imperial and Commonwealth History* and *International Labor and Working-Class History*.

The last half of the 19th century saw the arrival of the press in many African countries; in Eritrea, the *Evangeliska Fosterlands Stiftelsen*, also known as the Swedish Evangelical Mission (SEM), and the Catholic Mission were at the forefront of the print revolution. In 1863, Bishop Lorenzo Biancheri brought the first printing press with Ge'ez types to Massawa, while the Swedish Evangelical Mission in Emkullu printed its first book in 1885.

This paper analyzes the first two Tigrinya language periodicals published in Eritrea: *Mäl'əkti Sälam* (1909-1915, Peace letter) e *Nay Həzbə Itiopya un-ätäyna fätawi* (1916-, The True Friend of the Ethiopian People) published by the Swedish Mission and Catholic Mission respectively. The complete series of these two very rare periodicals has only recently been recovered and digitized, and are used for the first time in this paper.

After the analysis of the history of the two periodicals, the paper will analyze the cultural and political context that led to the appearance of the two magazines and discuss their historical relevance. In particular, the focus will be on the dissemination of literacy and

education in Eritrean society, differences in the theme contents between the two magazines, and the relationship between censorship and print in Colonial Eritrea.

Key words: banditry, brigandage, colonial administration, Eritrea, Nathan J. Brown's study

## **The Impossible Eritrean Code Mariano D'Amelio, Eritrean Law and Colonial Governance (1899-1909)**

\* Marco Fioravanti (University of Rome "Tor Vergata")

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**Saloon Nakfa**  
**Day 1**  
**3:00 – 3:30**



Marco Fioravanti is Full professor of History of Medieval and Modern Law at the University of Rome "Tor Vergata" where he also teaches History of Political Institutions. He coordinates the Doctoral Program in Public Legal Studies and the Graduate Program in Science of Administration and International Relations. He was Directeur de Programme at the Collège International de Philos-

ophie in Paris and Visiting Professor at the Université de Poitiers.

He is the author of more than 150 publications – including monographs, essays, and books reviews – ranging from French and colonial constitutional history to the history of Italian and European public law between the 18th and 20th centuries.

Lambert Ebitu is a Political Affairs Analyst specializing in African geopolitical dynamics and pan-African issues. Based in Uganda, he has been featured on RT media and published widely in Uganda's mainstream media on political affairs. He frequently contributes analyses on pan-African topics with Africa Interest media, where he explores Africa's evolving role within global alliances. His work brings a critical perspective on the socio-political trends shaping Africa's future within the context of multipolarity.

In this paper we want to address a topic that has been neglected by legal and social studies on Italian colonialism in Eritrea. Squeezed between the interest in the first Italian settlements that followed the acquisition of Assab Bay in 1869 and the fascist period with the proclamation of Italian East Africa, the period between the nineteenth and twentieth centuries has been greatly neglected. It is indeed very interesting especially under the lens of law. By following the process of (failed) civil codification for the Eritrean colony, we can trace the stages of assertion of colonial rule and reaction of the local populations. This unfinished process shows us much about the relation-

ships of domination and power between colonial power and Eritrean resistance, between Italian jurists and administrators and the Eritrean elite, in the system of legal apartheid that Italy had created against its colonial subjects.

The figure of Magistrate Mariano D'Amelio, whose career in Italy is well known and reached its peak with the presidency of the Supreme Court of Cassation, is less well known in his period as an administrator in Eritrea between 1899 and 1905. A judge and president of the court in Massawa, he provided for the judicial system that established the Court of Appeal in Asmara; he was the first president of this court. In charge of the colony's civil affairs, he had relations of collaboration and esteem with Governor Ferdinando Martini. Chairman of the commission for the Eritrean codes, he provided for the legal system of the colony with appreciated criteria. Main drafter of the draft civil code, published in 1909, which however never came into force.

Through the prism of civil codification, seemingly limited to one aspect of law, an attempt will be made to reconstruct a wider world of compromises, perspectives, ideas, conflicts and resistance between two peoples and between two different, but not always incompatible, ideas of state and society.

Key words: civil codification, Italian colonialism, nineteenth and twentieth centuries, pan-African, socio-political trends

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## Language & Linguistics

### English to Tigrigna: Direct Speech to Speech Translation

\* Meron Habteab, Meron Michael, Naod Berhane, Natnael Kahsay and Rahel Habtu: (Mai Nefhi College of Engineering and Technology)

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**Saloon Nakfa**

**Day 2**

**10:50 – 11:10**



Meron Michael has 5 years of experience in computer science and engineering program. Her main focus is on software developments like web development, mobile application development as well as AI model development.

Nowadays, most of the speech-to-speech translation applications and services use a three-step process. The first step is the speech-to-text translation using speech recognition. This is followed by text-to-text language translation and finally the text is synthesized into speech. As the availability of data and computing power improved, each of these individual steps

advanced over time. Although, the progress was significant, there was always error associated with the first translation step in terms of various factors. The error further propagated and quite often deteriorated as it went down the translation steps. This gave birth to ongoing budding research in direct speech-to-speech translation without relying on text translations.

This project is inspired from Google's Translatotron: An End-to-End Speech-to-Speech translation model. In this research, we address the task of speech-to-speech translation (S2ST): translating speech in English language into speech in Tigrigna language. This application is highly beneficial for breaking down communication barriers between English speaking users and users who speak the low resourced Tigrigna language. To accomplish this research work, we have used a transformer-based sequence-to-sequence neural network which can directly translate speech from English language into speech in Tigrigna language, without relying on an intermediate text representation. For a better model performance, we have used the pre-processing techniques like denoising, silence removing and conversion to mono channels using different pre-processing techniques. For evaluating our model performance, we have used both manual BLEU score evaluation and the MOS (Mean Opinion Score) techniques.

To implement the system, we have conducted three experiments in different scenarios. In experiment-1, we have used a Simple BI-LSTM (Bidirectional LSTM) model with 3 hours of

data. From this experiment, we have obtained a BLEU score of 9 and 6 for training and validation respectively. In experiment-2, we have used the Transformer model and increased the training data to 6 hours. A BLEU scores of 20 and 17 was obtained for both training and validation respectively. Similarly, in experiment-3, we have used a Transformer model by increasing the training data to 20 hours. The obtained BLEU scores are 30 and 24 for training and validation respectively. From the above results, it is possible to conclude that the proposed algorithm can effectively improve the performance of the speech-speech translation for the Tigrinya language with further enhancements.

Keywords: End-to-End Speech-to-Speech Translation, Translatotron, transformer-based sequence-to-sequence neural network, BLEU score, MOS score, BI-LSTM.

## **Exploiting AI for Advanced Language Processing and Analysis: Revolutionizing Language Studies**

\*  
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**Saloon Nakfa**  
**Day 2**  
**11:10 – 11:30**

Language studies have entered a new era of transformation with the integration of artificial intelligence (AI) technologies. This research paper explores the profound impact of AI in revolutionizing language processing and analysis, presenting a powerful concept that harnesses the potential of AI to advance the field. By leveraging advanced machine learning algorithms and natural language processing techniques, our study aims to showcase the groundbreaking capabilities of AI in enhancing language studies.

The integration of AI in language processing enables automated tasks that were previously time-consuming and labor-intensive. Through the application of sophisticated algorithms, AI systems can efficiently process vast amounts of language data, extract linguistic patterns, and generate accurate language models. This not only enhances the speed and efficiency of language analysis but also opens up new possibilities for exploring complex linguistic phenomena at a scale previously unimaginable.

One of the key areas where AI demonstrates its transformative power is sentiment analysis. By analyzing and interpreting the motions and attitudes expressed in language, AI algorithms can provide valuable insights into public opinion, customer feedback, and social trends. This has significant implications for fields such as market research, brand management, and social sciences, where understanding

sentiment plays a crucial role.

Moreover, AI-driven language processing enables semantic understanding, allowing systems to discern meaning and context from text. This has wide-ranging applications, from improving search engine algorithms to enhancing machine translation and natural language generation. The ability of AI to understand and generate human-like language opens up new opportunities for communication, cross-cultural understanding, and even creative expression.

By showcasing the transformative potential of AI in language studies, this research paper contributes to the advancement of the field and highlights its implications for researchers, educators, and practitioners. The findings underscore the need for interdisciplinary collaborations between linguists, computer scientists, and AI experts to unlock the full potential of AI in language processing and analysis.

In conclusion, the integration of AI technologies in language studies presents a paradigm shift in how we understand and analyze language. By harnessing the power of AI for advanced language processing and analysis, we enter an era where language-related tasks are transformed, insights are gained at an unprecedented scale, and new avenues for research and application emerge. The concepts explored in this research paper lay the foundation for future investigations and innovations in the field of language studies,

redefining the way we interact with and comprehend language in the digital age.

Keywords: Artificial intelligence, language studies, language processing, natural language processing, machine learning, sentiment analysis .

## **Gutturals and Ethiopian-Eritrean Semitic Languages**

\* Tesfay Tewolde

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**Saloon De-  
kemiahare  
Day 2  
4:30 – 4:50**

Ethio-Eritrean Semitic (EES) languages lower a vowel to a under adjacency to gutturals. According to some scholars, this is an innovation that EES languages inherit from Ge ez. Other scholars argue that the natural classhood of gutturals is regarded as universal rather than inherited from Proto-Semitic, Ge ez or any common origin of EES languages. The aim here is to examine the evidence that EES guttural segments are a natural class. To that end, verbs types and their stems with guttural and non-guttural radicals at the initial, medial and fi-

nal positions are discussed. The study shows that vowel lowering under adjacency to gutturals is not an innovation in EES languages. In fact, vowel lowering in guttural context together with the root consonant co-occurrence restrictions on gutturals, epenthesis in guttural context, cross guttural vowel assimilation, guttural degemination and historical merger of gutturals can be regarded as evidence that gutturals are a natural class.

Key words: gutturals, natural class, radicals, verbs

## **Language Change in Tigre Language since 1980: A Historical Linguistic Perspective**

\* Pietros Eyob: (Boarding Asmat Junior and Secondary School)

**Saloon  
Dekemhare  
Day 2  
5:10 – 5:30**



Mr. Pietros attended his elementary and junior school in Selam and Lalm-ba respectively from the academic year 2005 -2006 up to 2012- 2013. He attended his secondary level in Keren secondary school in academic year

2013 – 2014 up to 2015 -2016. He got his Bachelor of Arts in English language and literature from College of Business and Social Science Adi-kieh in 2023. And now he is working in Boarding Asmat junior and secondary school as an English teacher.

The general purpose of this research is to examine and analyze Tigre language change using historical linguistic point of view and to show the different factors that underlie this change. One of the main objectives of this study is to examine Tigre language change with respect to the five linguistic levels: phonology, morphology, syntax, lexical and semantics. The majority of the change was seen in lexicon and negligible change in syntax; however, the changes in the other three linguistic levels: phonology, morphology and semantics were also apparent. The causes of change in Tigre language includes; learning deficiency, contact of speakers of Tigre language with speakers of other languages, cultural factors, social factors, technological factors, political factors, religious factors, social media, and foreign influence. Further, this study discusses the attitudes of the Tigre speaking community in Eritrea towards language change in their language.

The samples of data were collected from different literatures, videos, and audios that are available in Tigre language. Interviewing to Tigre speaking community is also included. The collected data, then, were first transcribed

in the source language-Tigre, transliterated and then translated into English. Based on the findings, this research paper recommends to the Ministry of Education of Eritrea to encourage researchers to conduct several research papers on language change of Eritrean languages.

Keywords: cultural factors, learning deficiency, linguistic levels, political factors, religious factors, social factors, technological factors, Tigre language.

## **Relativization and Cleft Sentences in Tigrinya**

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**Saloon Dekemhare**  
**Day 2**  
**4:50 – 5:10**

Saloon Dekemhare

Day 2

4:50 – 5:10

Rainer Voigt is Emeritus professor. He was born in Neuruppin (Preußen, now Germany). His PhD is in Semitic Studies. He has been a chair of Semitic Studies at the Seminar für Semitistik und Arabistik of the Freie Universität Berlin.

Copula sentences or cleft sentences are an important focus construction found in a number of languages in the Horn of Africa, a construction which has so far not been sufficiently documented in all relevant languages. Until now only the Amharic and the very similar Tigrinya constructions have enjoyed special attention, and their constructions are compared with each other in Guss-Kositza (Verbalsysteme 2019). Hereby relativisation plays the decisive role.

I take this as an opportunity to start from relative clauses sentence transformations that are applied to an independent uncleft main clause. Here a distinction is made between simple and compound verbal sentences as well as nominal sentences. The relative transformation leads then to relative clauses, conjunctive subordinate clauses, only few of which can survive without a relative, and cleft sentences.

This leads to a veritable cornucopia of constructions. If one was to base one's analysis on the feature of sentence cleaving, which obviously also occurs in cleft sentences, one would also have to take other forms of sentences into consideration, where sentence cleaving can be found. But in those cases, no relative may appear in certain circumstances.

Keywords: Amharic constructions, cleft sentences, relativisation, Tigrinya constructions.

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## Law

### **Environmental Implications of and Liability for Acts of Violence in Maritime Spaces: The case of Rubymar**

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Office of the Minister, State  
of Eritrea)

\* Deborah Dawit: (Ministry of  
Justice, Zoba Court of Maekel Re-  
gion, State of Eritrea)

\* Luwam Mogos: (Ministry of Jus-  
tice, Legal Services Department, State  
of Eritrea)

\* Siphora Yohannes (L.L.B Candi-  
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ed Kingdom)

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**Saloon**

**Massawa**

**Day 3**

**11:10 – 11:30**

Mr. Munir Omer Mohamed holds an L.L.B degree and is a candidate for an L.L.M degree from the University of South Africa (UNISA). He is currently working at the Office of the Minister

of Justice, the State of Eritrea. He previously worked as the lead public prosecutor in the city of Aqurdad and as a legal researcher in the legal services department of the Ministry of Justice. He also taught Intellectual property Law, environmental Law, Information technology Law and other courses as an adjunct lecturer in the department of Law, Adi Keih College of Business and Social Sciences.

On February 18, 2024, the Yemeni belligerent group Houthi launched an attack on the oil tanker Rubymar. This had far-reaching consequences, particularly in terms of environmental well-being, in how the hull was damaged and there was a subsequent oil spillage. This resulted in the release of a significant volume of oil into the surrounding waters. This poses risks to marine life, coastal ecosystems, and the livelihoods of local communities. Ahmed Awad Bin Mubarak, the prime minister of Yemen's internationally recognized government termed it as "an unprecedented environmental disaster". The Yemeni government also expressed "regret over the sinking of the ship, which will cause an environmental catastrophe in the Yemeni territorial waters and the Red Sea", attesting that neighbouring states in the Red Sea will have their interest affected by the spillage.

International environmental law provides a framework for assessing liability in such cases. Principles of strict liability, due diligence, and state responsibility guide the evaluation of parties responsible for environmental harm caused by oil spills. This paper explores the possible avenues for liability, including state responsibility, vessel owner liability, and

liability from non-adherence to relevant international conventions.

Starting with state responsibility, international environmental law holds that whichever state on whose territory the cause of pollution happened is responsible for the ensuing damages. Accordingly, Yemen would potentially be responsible. However, a challenge poses in asserting such responsibility given how the internationally recognized government of Yemen doesn't have effective control in the coastal territory of the state.

Keywords: environmental catastrophe, liability, oil spillage, Red Sea, state responsibility, vessel owner liability.

## **Examining the Legal Implications Eritrea Retain vis-à-vis the AfCFTA Agreement; A special Emphasis on the Protocol of Trade in Goods**

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**Saloon  
Mendefera  
Day 2  
10:50 – 11:10**

Ms Soliana graduated from the Department of Law with a great distinction in the year 2023. She had worked as

a paralegal. Moreover, she had worked as an assistant legal advisor for the Commercial Bank of Eritrea. She is currently a judge at the Regional Court of Asmara.

The arrival of AfCFTA Agreement in 2018 has been a fast-forwarded realization of the long-held AU-vision of having an integrated, prosperous and peaceful Africa. It is a framework agreement comprising six protocols covering trade in goods, trade in services, investment, intellectual property rights, competition policy as well as dispute settlement. At present, all but one African country- Eritrea- have signed the AfCFTA Agreement. The most plausible question that rings in the heads of many is whether the 'inaction' on part of the Eritrean government is an informed action. Or, has an evaluation been made with respect to the costs of the AfCFTA Agreement to Eritrea's trade policy, economic goals and societal interest; and was actually found out that Eritrea would be the loser in this game? No assessment study of any kind exists till this date. The question of whether Eritrea has a benefit to reap from joining the AfCFTA Agreement is yet to be argued. This paper, therefore, attempts to address this issue from the legal point of view, focusing on the Protocol of Trade in Goods only.

Accession to the AfCFTA Agreement, should that decision be made, might oblige Eritrea to undertake a series of amendments to its laws and to introduce new laws. Since law is a weapon used to effect a certain end or protect a certain interest, change of laws has the probable implication of change of goals. So, the greatest question that this paper

aims to answer is whether a great transformation of laws would take place; one that puts Eritrea's economic goals and/or societal interests at jeopardy. In search for answer, the writer referred to the Macro-Policy Document of 1994, made a careful comparison between the Protocol of Trade in Goods and Eritrean legal regime of trade in goods; examined the rationale behind the Eritrean legal regime of trade in goods; and conducted a thorough study on Eritrea's trade pattern of over 25 years.

The fundamental finding of the paper is that no drastic change will overtake the greater part of the Eritrean legal regime of trade in goods. And the only laws that are susceptible to change are laws related to tariffs and non-tariff barriers. This means that Eritrea will have to make certain shifts in its tariffs and non-tariff barriers regulations as part of its trade policy arsenal.

The paper concludes that the certain changes that Eritrea will have to make in its regulations will hardly have any negative implications. In turn, Eritrea's economic goals and interests will find greater realization and stronger protection, respectively, on the platform provided by the Protocol.

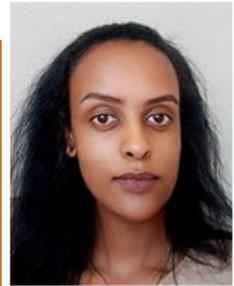
Keywords: AfCFTA Agreement, economic goals, societal interest, trade policy, transformation of laws.

## Extradition: A Tool for Eritrea to Prosecute and Punish Fugitives

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**Saloon  
Mendefera  
Day 2  
11:10 – 11:30**



Ms Wintana Kahsay Berhe holds Bachelor of Law from the College of Business and Social Sciences. Currently, she works at the Central Region Court Asmara as a Criminal Bench Judge. She is a presiding judge at the Criminal Bench at the Central Region Court Asmara. Interested in Criminal Law and Corporate Law.

There is serious concern in raising of stern organized crimes in the region of East Africa. Extradition is a common element under international law and is a mechanism of combating crimes in the international arena. It is recognized and has been a globally applied procedure. As part of the East African region Eritrea has and yet will face threats of organized crimes and therefore makes

this study very timely and pertinent. Among many others the most concerning crimes include human and drug trafficking, counterfeit currency and other organized crimes.

The movement of people and goods, varying levels of development and security, the interconnectivity of it all, fuel complex crime in the region of East Africa. In comparison to other countries in the region, Eritrea has managed to inculcate basis to uphold peace and security locally. However, the ongoing mass movement and irregular migration intrinsically leads to exploitation of vulnerable populations for material gain by criminal organizations or syndicates. The crime of human trafficking largely for labor, sexual exploitation and organ removal has been listed in the region of East Africa as an emerging crime priority and has taken on various dimensions that go beyond exploitation, including the use of direct violence to fuel a regional instability. Another rising crimes in the region is counterfeit currency and has become a serious threat in several markets. Large amounts of counterfeit currency were found on several national markets in the region of East Africa. It is likely that this risk will continue and pose a real risk to economic and money market stability in the future. Drug trafficking poses a major organized crime threat to the region, impacts communities, not just in terms of substance abuse, but also as a driver of violence and other related crimes (i.e. theft, prostitution, human trafficking,

etc.). In Ethiopia for example, cocaine trafficking is rapidly increasing due to direct flights from Sao Paulo, Brazil to Addis Ababa. The flight routes have created favorable conditions for trafficking cocaine from South America to Asia and Europe via Addis Ababa.

Every state should prosecute and sentence crimes committed in or out of its territory, where it has jurisdiction over. The ease of transportation from one country to another country and the illegal migration has provided fugitives in Eritrea to escape prosecution and sentence. After the independence of Eritrea, the number of files that were suspended without prosecuting the fugitives or decided in absentia but failed to sentence fugitives were less than 1%; however, as of 2018 the number of files has raised to 20%. Eritrea so far has not utilized any arrangements for extradition of fugitives; nonetheless as discussed above the risk of serious organized crimes are not getting any lesser. Owing to this fact the study will use conceptual approach with the use of statistical data and will bring practical cases to promote coming into use of extradition treaties and laws in Eritrea to overcome organized crimes and uphold peace, security and justice.

As deliberated above there is an increasingly serious issue of human trafficking which has made numerous Eritreans victims of despicable crimes and abuses. As long as these crimes are transnational the inherent utilization and development of extradition treaties

and laws is a pre-requisite to the State of Eritrea.

Keywords: Extradition treaties, human trafficking, counterfeit money, drug trafficking, prosecuting and sentencing fugitives, organized crimes.

## **International Legal Response to Acts of Violence in the Red Sea and its Implication to Eritrea**

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**Saloon  
Massawa  
Day 3**

**10:30 – 11:10**

Ms Luwam is a former regional public prosecutor and currently a Legal Service Officer at the Ministry of Justice. She earned her LL.B. with distinction honours from Adi-Keih College of Arts and Social Sciences, Eritrea, and is following her Master's degree studies in International Economic Law from the University of South Africa. She is the first female law graduate in Eritrea who succeeded in publishing her award-winning undergraduate thesis published in the International Journal of Arbitration,

Mediation and Dispute Management. She has also examined senior theses in the Department of Law in the fields of International Humanitarian Law and State Responsibility, Criminal Law and Procedure, and Media Law.

The Red Sea is a vital waterway for global trade and regional stability, connecting the Mediterranean Sea, the Indian Ocean, and the Gulf of Aden. However, the Red Sea has also witnessed increasing violence and instability, the most recent example of which is the capturing of the Galaxy Leader, a Japanese operated cargo ship on November 19th 2023 and the many other acts of violence on commercial vessels conducted by the Houthi rebels.

These attacks pose a serious threat to the freedom of navigation, the safety of maritime commerce, and the stability of the neighbouring countries, especially Eritrea, which has a long coastline with the Red Sea.

This paper examines the international legal response to the acts of violence in the Red Sea and their implications for Eritrea, a coastal state that has a strategic interest in the security and stability of the waterway. The paper analyses the applicable legal frameworks, such as the United Nations Convention on the Law of the Sea, the International Maritime Organization conventions, the relevant Security Council resolutions, and other relevant public international law frameworks, and evaluates their effectiveness, legitimacy, and challenges in addressing the security situation in the Red Sea.

The paper also explores the role and interests of Eritrea in the Red Sea, and how the country can contribute to the promotion of peace and cooperation in the region. The paper discusses the statement of the Eritrean government regarding the security of the Red Sea, and assesses its position and role in the regional and international context.

The paper highlights the challenges that pose in regard to international maritime violence and proposes that the international community as a whole and the coastal states in the Red Sea in particular, should enhance their coordination and cooperation to combat the threats in the Red Sea, and that Eritrea should play a more active and constructive role in the regional dialogue and initiatives. The paper concludes by offering some recommendations for enhancing the legal and diplomatic efforts to address the Red Sea crisis and to protect the rights and interests of Eritrea and other stakeholders.

Keywords: legal and diplomatic efforts, Red Sea, safety of maritime commerce, international maritime violence,

## Legal Transplantation in Eritrea: Comprehensive Evaluations to Strengthen the Law

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**Saloon  
Dekemhare  
Day 3  
9:10 – 9:30**



Mr Thomas is a Judge at First Instance Court of Debarwa, Zoba Debub. He previously worked as Assistant Judge at First Instance Court of Areza, Zoba Debub. He earned his LL.B. degree from Adi-Keih College of Business and Social Sciences, Eritrea with VGD. His award-winning senior thesis: Legal Transplantation in Eritrea is source to the current presentation. He has been involved with the project for Consolidated Compilation of Eritrean Laws since his Second-Year studies. Furthermore, he is an active member of the National Union of Eritrean Youth and Students (NUEYS) conducting various seminars, lectures and other voluntary activities. His interest fields include Comparative Law, Constitutional and Administrative Law, Legislative studies,

Public Policy and Political Sociology.

Throughout Eritrean legal history, legal transplantation – ‘the moving of a rule or a system of law from one country to another, or from one people to another’ – has a great place in development of Eritrean legal order. However, this process of law making creates serious drawbacks in terms of relevance and effectiveness of these transplanted laws, if the proper transplantation process is not adopted. Thus, this makes crucial for the question of how legal transplantation, the inevitable one and the most common form of legal change, could be successful.

The researcher upholds the view that the process of adopting foreign laws in Eritrea, should be passed through appropriate screening procedures. If, however, foreign laws are adopted to Eritrean legal system without thorough examination, it would lead to a failed transplantation process and a big chance of non-implementation, wholly or partly. This non implementation of promulgated law, due to its incompatibility with the local social context of Eritrean people, signifies not only collapse of the intended law but would also create wastage of resources in legislation and enforcement, and perhaps most importantly, the negligent creation of the false impression that such legal problem is adequately addressed in Eritrea.

Therefore, this paper examines and evaluates the practice of legal transplantation throughout Eritrean legal history. It traces back from the period of cus-

tomary laws till the contemporary period. Moreover, the paper suggests the proper process of adopting foreign laws and concepts in Eritrean legal system in order to achieve the desired purpose of any law reform process.

Keywords: Legal transplantation, Eritrean legal system

## Multiple Citizenship: Legal Rights and Responsibilities of Eritrea’s Dual Citizens

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**Saloon De-  
kemhare  
Day 3  
8:30 – 8:50**

This paper delves into the vague landscape of dual nationality within the legal framework of Eritrea, highlighting the discrepancies that surface amidst statutory provisions and real-world applications.

It underscores the provision that allows Eritreans by birth, who reside abroad, to retain a foreign nationality, provided they present adequate justification for such dual identity.

The discourse extends to a critical examination of dual citizenship, weighing its benefits against potential limitations. The paper categorizes the diverse groups of residents in Eritrea, elucidating the specific criteria that govern the grant of nationality to each group.

A significant portion of the analysis is dedicated to the challenges and considerations faced by dual nationals, particularly those serving in the military, where allegiance and duty often intersect with legal and ethical dilemmas.

Adding depth to the research, the paper includes conducted interviews with members of the Eritrean diaspora. Their experiences offer valuable perspectives on the complex effects of dual citizenship on personal identity and responsibilities.

Keywords: Dual citizenship, Eritrean Nationality Proclamation, diaspora.

## **The Eritrean National Symbols: The Need for Legal Recognition and Standardization**

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**Saloon De-  
kemhare  
Day 3  
8:50 – 9:10**

Ms Soliana Asmelash Yacob holds L.L.B from the College of Business and Social Sciences, Department of Law. She is currently L.L.M Candidate in University of South Africa (UNISA), Department of Intellectual Property.

Symbols serve as a powerful psychological and ethical tool for expressing affinities and allegiances to a concept or reality. National symbols are helpful in depicting a country's past, present, and future in this way. These national emblems serve as more than just state emblems. They stand for the people's identity. Furthermore, a person's national identity is neither something they naturally acquire as they get older nor something they are born with. National identity must be learned, just like any other identity. The lengthy road journey filled with colonization and patriotism taught Eritreans this lesson. The national flag, national emblem, national song, national currency, national coat of arms, national bird, and so forth are examples of national symbols. However, the researcher only plans to discuss the first four in this work. When necessary, comparative analyses of other nations will be used to illustrate the legislation and customs surrounding the aforementioned national emblems in the context of Eritrea.

A number of problematic concerns have surfaced, such as the national flag's uneven colors, design, construction, and symbolism. The goal of the study is to clarify the issues that arise from both domestic and foreign photo capture. Be-

cause Eritrea lacks standards and laws, it has been subjected to international inspection and branding; for this reason, the researcher feels that this study is critical to Eritrea's reputation both inside and outside of its borders. There are disparate variations of the national insignia, which further demonstrates the discrepancy. Even while the national anthem does not have as many issues as other national symbols, it still brings up a lot of issues, including respect for the anthem and the right to free speech. Regarding how the notes are handled and distributed, the national currency—another significant symbol of the nation—also has issues. Among other things, they've been burned, pulled apart, and scrawled all over.

In order to prepare legislation that closes the existing gap between the law and unchecked practice and lessens the negative experiences the nation has thus far suffered as a result of this gap, the goal of this paper is to critically analyze the practices of and legal gaps in the already existing national symbols. The researcher will also conclude with a proclamation that covers every topic covered in the study.

Keywords: Eritrea, national emblems, national identity, national symbols, standards and laws

## The Role of Traditional Law in the Development of the Eritrean Legal System

\* Salvatore Mancuso

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**Saloon Nakfa**  
**Day 1**  
**2:30 – 3:00**



Salvatore Mancuso is Professor of comparative law and legal anthropology at University of Palermo. He is also Honorary professor of African law, at Center for African Laws and Society, Xiangtan University and a Visiting professor at Somali National University.

Legal pluralism is probably the most important characteristic of African legal systems where the presence of different normative orders at the same time creates situations of conflict among them. Such conflict is a result of the traditional approach to legal pluralism where the different normative orders are competing one with the other under a state that purports to have the monopoly to produce laws. Unfortunately, very often such laws are a pure transposition of a

rule borrowed from another (generally Western) legal system into the receiving one. The consequence is that quite often citizens have scarce confidence on state law and prefer to resort to other set of rules to which they are more familiar, even if such rules remain at informal level.

The situation could be different if the traditional approach to legal pluralism is changed from the usual vision – based on the competition of the different normative orders – to a situation where the different normative orders cooperate to produce a system of rules that is closer to the local legal culture.

Eritrea has a variegated patchwork of traditional normative systems, also influenced by different religious beliefs. The Eritrean state is also under a process of modernizing its legal system by producing new sets of rules that supersede those inherited from the Ethiopian legal system after independence. In this process of reformulation of its legal system, the Eritrean state seems to be attentive in giving proper consideration to the different Eritrean legal cultures, even if the way in which this should be done remains uncertain.

The paper tries to explore the issue of legal pluralism in present Eritrea, and how it could be possible to create some forms of cooperation between state law and traditional law in the development of the Eritrean legal system.

Keywords: Eritrea, legal pluralism, legal systems, state law, traditional law .

## **The Status of US and EU Unilateral Sanctions against Eritrea under International Law**

\* Divora Eyob  
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Asmara, Eritrea)

\* Saron Sbhathleab (Ministry of  
Justice, Eritrea)

\* Isaias T. Berhe (College of Busi-  
ness and Social Sciences, Adi Keih,  
Eritrea)

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**Saloon Nakfa**

**Day 1**

**5:40 – 6:00**

It has been a practice for states to impose unilateral sanctions, which is outside the legitimate multilateral sanctions imposed by the UN Security Council pursuant to Chapter VII of the UN Charter. In the year 2021, both the United States of America (USA) and the European Union (EU) has consecutively imposed sanctions against Eritrea – specifically related to the civil war that broke out in Ethiopia in 2020. The unilateral sanction targeted the government of Eritrea, the Eritrean political party, Eritrean entities and targeted sanction against individual officials of

Eritrea, which Eritrea repeatedly rejected as unfounded and against international law.

The debate on the legitimacy and status of unilateral sanctions under international law is not yet settled. Even the uncertainties and ambiguities of the terminology makes the discussion and application of any pertinent standard of unilateral sanction within the ambit of international law difficult. On the one hand there is an argument on the illegality and illegitimacy of unilateral sanctions under international law: unilateral sanctions violate the pillar principles of the UN Charter, including “principle of sovereign equality and territorial integrity, principle of nonintervention, peaceful settlement of disputes and duty to cooperate.” Its negative impact on the basic human rights of citizens, right to self-determination and right to development are also the points used to denounce unilateral sanctions. On the other hand, there is an argument that holds unilateral sanction as an act that is not specifically prohibited under the UN Charter and international law in general. They support their argument with the holding of the ICJ in the Nicaragua vs. US case. And generally most states impose unilateral sanctions based on their domestic laws, which may be regarded as the exercise of their sovereignty.

In the context of the controversial and debatable nature of the legitimacy and legality of unilateral sanctions the paper aims to examine the status of the uni-

lateral sanctions imposed by US and EU against Eritrea under international law, without delving into the substance or merit of the allegation of US and EU against Eritrea. The paper will also discuss the peculiar aspect of the case – unilateral sanction imposed in the context of third state intervention in an internal armed conflict. Eritrea not only it did reject the sanctions imposed by US and EU, but it has been frequently espousing against the practice of unilateral sanctions in international relations. Thus, the paper will examine the consistency of Eritrea’s stance on unilateral sanctions, its merit and its implication on the ongoing discussions and debate by studying the specific case of Eritrea. The ultimate objective of the paper will be to analyze the legality, enforcement and consequences of unilateral sanction directed toward states especially developing states, in addition to its legal applicability as a tool of foreign policy and possible remedies Eritrea may claim from the sanctioning states if it is found illegal or possible response to be given if is found to be legal.

Keywords: Eritrea, EU, international law, international relations, unilateral sanction, US,

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## Medicine & Health Sciences

### Determinants of Modern Contraceptive (mCP) use among Married Rural Women in 21 African Countries: Multilevel Modeling using recent Demographic and Health Surveys

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**Saloon  
Dekemhare  
Day 1  
3:30 – 3:50**



Mr Filmon Ghebreyesus Filmon is a public health officer who completed his bachelor's degree in public health from the Asmara College of Health Sciences (ACHS). He currently works at Environmental health unit, Ministry of Health Maekel region branch. He previously worked at the national service training center, Sawa as a public health officer. He is the chair of technical committee of the Eritrean Public Health Association

(ERIPHA). Mr. Filmon is a researcher concentrating on maternal and child health using demographic & health surveys, and malaria through geo-spatial analysis.

Family planning is a cost-effective and high-yield investment with benefits beyond controlling birth. Previously stunted efforts have been revived following the FP2020 initiative that aimed to provide contraceptives to women in the poorest countries. Since its start, the number of contraceptive users has grown globally yet, progress has been uneven, with women in rural areas and other vulnerable groups often being neglected.

Data from 21 Sub-Saharan African countries was compiled to create the dataset for this study. This study focused on rural married women residing in those countries. Variables conceptualized to affect contraceptive use were categorized as individual and community-level variables. Tables and graphs were used for descriptive statistics while two-level multilevel regression was done to find out factors associated with contraceptive use. Prevalence of modern contraceptive use was found to be 34.6% with injectable and implants being the most common.

Contraceptive use varied across countries with Southern Africa countries recording higher proportion. Individual factors that affected contraceptive use include age, wealth quintile index, educational level and, fertility desires. Community variables that were found to be associated with contraceptive use include mean age of debut (sex, birth and marriage), community wealth quintile index, community domestic violence score and decision autonomy scores and

so on.

The modern contraceptive use among married, rural residing women in 21 countries was low compared to other studies. Generally, contraceptives have been effectively utilized in a community where women are typically empowered, have at least primary education, and have higher decision autonomy. Identifying individual and community factors dictating contraceptive use would help governmental and non-governmental organizations to scale up their effort to provide contraceptives for poor and marginalized societies in Sub-Saharan Africa.

Keywords: contraceptives, FP2020, Sub-Saharan Africa, education, empowerment, community factors.

## **Diagonal Reference Modelling: Effects of Educational Differences between Couples on Women's Healthcare Utilization in Eritrea**

\* Gebrenegus

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**Saloon  
Massawa  
Day 1  
2:30 – 2:50**



Gebrenegus Ghilagaber is Professor of Statistics and former Head (2011 - 2020) at the Department of Statistics, Stockholm University, Sweden. He holds BSc. and MSc. degrees in Statistics from Addis Ababa University (Ethiopia), PhD degree in Statistics from Uppsala University (Sweden), as well as PhLic. degree in Demography from Stockholm University (Sweden). His research interests fall at the intersection between Statistics and Demography, including survival and event-history analysis, multi-level and multi-process modeling and Bayesian inference with applications in demography, public health, environment and football analytics. His works have been published in Journal of the Royal Statistical Society, Mathematical Population Studies, Quality & Quantity, Social Science & Medicine, East African Medical Journal, Public Health, Scandinavian Journal of Public Health, Southeast Asian Journal of Tropical Medicine & Public Health, and in books and as book-chapters in edited volumes published by Springer and Wiley.

We examine effects of differences in education between couples on women's propensity to utilize health care (specifically deliver at health facilities instead of at home). We contrast results from conventional logistic regression with those from diagonal reference models (DRM). Data used for illustration come from the 2002 Eritrean Demographic and Health Survey (DHS) and consist of 4255 women who have borne at least

one child by the survey time (with a total of 6366 children). Standard logistic regression models indicate strong effects of educational differences on women's decision to deliver at health facilities. On the contrary, results from Diagonal Reference Modelling which accounts for origin (woman's education), destination (partner's education), and mobility (differences between couples' educational levels) show that there is no mobility effect. If any,

DRM reveals that woman's own education is more important than her partner's education in such decisions. That the mobility effect disappeared in the DRM is in accordance with previous studies that used DRM and where mobility had no effect on the outcome variable in diverse fields. But, our recommendation is not to encourage users to use the results from DRM. Rather, we recommend to examine the DRM model more closely in the light of recent studies suggesting that an artifact of the model itself may lie behind the lack of mobility effects

Keywords: diagonal reference models, educational differences, health facilities, partner's education, woman's own education

## Diarrhea Among Under 5 Children and Its Associates in 25 African Countries: Multilevel Analysis of Recent DHS Studies

\* Mebrahtu, F. G., Kahsay, Y., Feven Beletse Negash and Teklemariam, H. M.

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**Saloon Nakfa**

**Day 3**

**8:50 – 9:10**

Ms. Feven was born and raised at Asmara, Eritrea. Her passion to help the disadvantaged people grew up, and has led her to join health sciences. She studied Public Health and graduated in, 2019. She worked in Hagaz, Zoba Anseba, Edagahamus community hospital, and Quarantine hospitals during the covid 19 among pandemic task force as Public Health Officer. She is interested in conducting health researches and has successfully accomplished more than four researches.

Introduction

Despite being preventable and easily treatable, diarrhea continues to sicken and kill millions of children. Majority of the burden lay at the back of developing countries notably, Sub Saharan

African countries. Moreover, diarrhea causes huge economic burden and is a major source of poverty. Several factors are believed to be associated with diarrhea. These include environmental, socio-economic, and community factors. A notable factor to consider when studying causes of diarrhea is water, sanitation, and hygiene. Analysing those factors across countries and communities and identifying the most significant factors could help the efforts to combat diarrhea in children. This study aims to analyse the prevalence of diarrhea and factors associated with it in 25 sub-Saharan African countries.

### Methodology

This study utilized secondary data from the demographic and health survey (DHS) conducted between 2013 and 2022. Permission to use the data was requested from [measureDHS.com](http://measureDHS.com) and data was downloaded after the request was approved. For this study we have used the children file to do the analysis. The outcome variable was the occurrence of diarrhea two weeks prior to the survey period. The predictor variables were conceptualized by conducting extensive literature search to identify the most important factors that affect diarrhea. Descriptive analysis was done using tables and maps and multilevel modelling (MLM) was done for inferential analysis. In total 4 models (null, individual variables, community variables, full model) were made. Akaike information criteria and Bayesian information criteria were used to

identify the best model.

### Results

The study included 265606 children across 25 countries. Children from Nigeria were the most numerous followed by Kenya, Congo, and Malawi. Of the total children 15% have experienced diarrhea two weeks prior to the survey. Burundi had the highest prevalence of diarrhea (22.45%) followed by Malawi (21.65%), and Namibia (17.52%). The lowest prevalence of diarrhea was found in Serra Leone (7.1%) and Madagascar (8.2%). Pooled prevalence of diarrhea among all countries was 14.8%. In the inferential analysis, model III (Full model) was the most reliable model and it indicated wealth quintile index, mother's education and age, breast feeding initiation, child sex, child age, child nutritional status, distance to health facility, and health insurance were the most significant variables that affected diarrhea.

### Discussion

The findings of the study noted Children from the highest and higher economic groups had respectively 19.4% and 8.8%, lesser odds of having diarrhea compared to the lowest socio-economic group. The study revealed that Child's odds of getting diarrhea declines concurrently with the increase age of mothers. Mothers aged between 45 and 49 had the lowest odds of their child succumbing with diarrhea at 36.5% less odds, compared to mothers between the ages of 15 and 19. The possible reason for this could be that older moth-

ers may have higher knowledge on the symptoms, mode of transmission, and prevention of the diarrhea than younger mother, which translates to comparatively higher skills and tact on child-care. Our study also noted that the odd of diarrhea is nearly three-folds among children aged 6 to 12 months and nearly 2.5 times among children aged between 13 and 24 months, compared with children aged less than 6 months. The most plausible explanation of this trend is that, at this age (6-12 months), children began socializing by crawling, walking, and is possible exposed to foster other than their mother.

#### Conclusion

Diarrhea was found to be unacceptably high in the study countries. Factors that were found to be highly associated with diarrhea should further be studied to ascertain their contribution to high burden of diarrhea. Moreover, global organizations such as the world health organization should place more emphasis in combatting diarrhea as doing so would generate higher return of investment to individuals, families, and communities.

Keywords: community factors, diarrhea, economic burden, environmental factors, poverty, socio-economic factors,

## Double burden of Malnutrition: A novel Challenge and an Opportunity to Handle Nutritional Problem in East Africa

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**Saloon Nakfa**  
**Day 3**  
**9:10 – 9:30**



Double burden of malnutrition is the coexistence of undernutrition (Macronutrient and Micronutrient deficiencies) and over nutrition in different levels of population. It can occur at the population level, at household and at individual level. Transitions in nutrition, epidemiology and demography have been identified as possible drivers of double burden of malnutrition in low- and middle-income countries. By 2030 nearly half of the global populace is projected to become overweight. Many Sub-Saharan African (SSA) countries have historic huge challenge with

undernutrition, while problems arising from overnutrition such as overweight, metabolic disorders are increasing at fast rate. Understanding factors that dictate this dynamics and nutritional problems benefit Eritrea, in its way of securing social and economic development and achieving SDG goal 2.2.

The study utilized secondary data from demographic and health survey done from 2013 to 2022 across 9 countries of east Africa. The outcome variable was conceptualized into dichotomous variables. The predicator variables were conceptualized into maternal, child, household and community factors. Descriptive analysis was done using tables and graphs while logistic multilevel modelling was done to identify the most significant factors associated with DBM.

The result of the study illustrates the need for holistic approach to nutrition as the current method replace one form of nutrition by other type in effort to treat the former. The current method of treating malnutrition is a risk factor for developing overnutrition. Planning interventions to combat under- and over nutrition will require addressing all forms of malnutrition at all levels by considering biological, behavioural and environmental factors that drives them. This study could contribute in that sphere.

Keywords: DHS, Double burden of malnutrition, East Africa, Eritrea, Nutrition.

## Emergency Peripartum Hysterectomy in Mendefera Hospital: Case-Control Study

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**Saloon  
Dekemhare  
Day 1  
2:50 – 3:10**

Background: Emergency peripartum hysterectomy is a life-saving procedure which involves the surgical removal

of uterus and is usually performed for uncontrollable maternal haemorrhage when all other conservative management has failed. The aim of this study was to determine the incidence, indication, risk factors and perinatal/maternal outcome related to EPH performed in Mendefera Regional Referral Hospital.

**Methods:** Case-control study was carried out in women, who underwent EPH over a period of almost 8 years. Controls were women, who had spontaneous vaginal delivery or were delivered by Caesarean section, without EPH. The findings were analysed using Stata 14.

**Results:** During the study period, there were a total of 15,527 deliveries and 31 cases of emergency peripartum hysterectomies, giving an incidence of 2 per 1000 deliveries. The mean age, parity, and hospital stay of the cases was 31.5, 4.0 and 5.5 respectively. The main indications for the procedure were uterine atony (38.7%) and uterine rupture (25.8%). Factors showing a significant association with EPH were: being 40+ years of age (OR 10.6; 95%CI 1.5-76.1), being grand multiparous (OR 8.0; 95%CI 2.1-30.4) and CS on the index pregnancy (OR 16.6; 95%CI 7.80-35.95). Subtotal hysterectomy was performed in majority (74%) of cases. The case fatality rate and stillbirth rate was 13% and 34.4% respectively.

**Conclusion:** The incidence of EPH in our institution is very high and fetal outcome was poor. The commonest indication for EPH was severe haemorrhages most notably caused by uter-

ine atony or uterine rupture, which are largely preventable.

**Keywords:** haemorrhage, emergency peripartum hysterectomy, incidence, indication, feto-maternal outcome

## Emerging Health Challenges and Prospects in Eritrea

\* Tekeste Fikadu

**Saloon  
Massawa  
Day 2  
8:30 – 9:00**



Dr. Tekeste Fikadu is a veteran fighter and an associate professor of Surgery in the Department of Surgery Orotta School of Medicine. He is also a renowned writer. He published a number of books and scholarly articles. He served in various capacities, both before and after Independence. He studied Pedagogue (Education) at Harar Teachers' Training Institute (H.T.T.I) Ethiopia, and earned a Diploma in Education. He Joined Faculty of Science H.S.I University Addis Ababa. Parallel to his studies. He did extensive research in the Pathobiology Research Laboratory for three years. He Joined Medical School of H.S.I University and graduated: Doctorate Degree in Medicine. He Worked

in the Dept. of Surgery, Itege Menen (now Mekane Hiwet) Hospital, Eritrea. The Black Lion Hospital, Addis Ababa, Adwa with Irish Medical Team, in the dept. of Surgery.

**Background:** Communicable Diseases (CDs) and Non-Communicable Diseases (NCDs) have been the main disease burdens in the developing and the developed countries respectively. Both CDs and NCDs deter the fulfilment of Sustainable Development Goals (SDGs) in the world. In the past, the CDs rather than the NCDs had been the main cause of mortality and morbidity in most Sub-Sahara African countries. However, there seems to be a paradigm shift on the disease spectrum.

**Objective:** The aim of this study is to assess the epidemiology of CDs and NCDs in Eritrea and to come-up with recommendations for intervention.

**Methods:** This study assesses the general trend of the CDs and NCDs in the world and Eritrea in particular. In order to study the state of these diseases in Eritrea, data from the Health Management Information System (HMIS) of the MOH, Eritrea was thoroughly reviewed. The HMIS report is composed of data gathered regularly from all health facilities located in the country.

**Results:** The study showed that CDs are decreasing while the NCDs are on the rise, leading to a double burden state of these diseases in Eritrea. The NCDs trend is huge emerging challenge to Eritrea and other Sub-Sahara African countries which are in similar situation.

**Conclusions and Recommendations:** Robust health promotion and prevention measures with the aim of promoting public awareness is of paramount importance. It needs to be clear to all health professionals that our focus should not only be on the elimination of the CDs but also the NCDs, as Eritrea is currently under threat from the NCDs.

## **Insights on Girl-child Marriages in Eritrea: A Qualitative Exploration of Victim's Experiences and Perspectives**

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**Saloon Nakfa**  
**Day 3**  
**8:30 – 8:50**



Dr. Ghidey holds BSc in Public Health Nursing and MSC in Clinical Nursing from University of Asmara and University of Northern Colorado, respectively. Her PhD is in Maternal Health. She published more than 25 articles and supervised several senior project papers

as a requirement for BSc and MSc, degrees. She has also conducted consultancy services to the UoA and OCMHS.

**Background:** Reports indicate that Eritrea is one of the countries with highest rates of early girl child marriages globally. However, data on multiple dimensions of the practice is severely limited. In this study, we attempted to describe the lived experiences of child brides in specific communities in Eritrea.

**Design:** A phenomenological qualitative research approach was used. The Eritrean Population and Health Survey 2010 (EPHS) data was used to identify geographical locations with high prevalence of child marriage. Recruitment was undertaken with the help of Zoba National Union of Eritrean Women (NUEW) leaders. Ultimately, twenty-five (25) women, meeting a pre-set criterion, were identified. A self-developed interview guide was used to prompt specific responses on a range of variables. The Giorgi's phenomenal approach was used to analyze the data.

Mean = 14.88.

**Results:** Twenty-five child brides participated in this study with age at marriage ranging from 13-16 years. The mean age was 14.88 years (standard deviation  $\pm$  1.096). Distribution with respect to ethnic background was as follows: Tigrigna = 11(48%); Afar = 4(16%); Tigre = 4(12%); Rashaida = 2(8%); Kunama 2(8%); and Nara = 2(8%). The mean age of the husbands at marriage was 32.36 with SD of 4.26 years. Of all the participants 48% be-

longed to the Coptic Orthodox denomination and 52% to Islam. Overall, we noted that most marriages are parent – directed and forced; that sexual, physical and psychological trauma is common; likelihood of divorce is high and premature termination of schooling/education is a norm. We also noted that subsequent experiences are largely driven by deeply embedded discriminatory stereotypes and patriarchal attitudes that are rooted in religion (Coptic Orthodox Christianity and Islam) and tradition. Multidimensional poverty was also recognized as a driver that resulted in an inexorable consequence of child marriage in communities across Eritrea.

**Conclusion:** To address these issues, priority should be directed at retention of girls in schools; economic empowerment of families; and norm change (socio-cultural, religious norms/practices). To appropriately target these efforts, more granular, context-specific data will be required otherwise, Sustainable Development Goals will never be achieved leaving majority of young female girls behind.

# Medicine and Biotechnology

\* Dr. Abraham Bahre Wolde

**Selam  
Conference  
Centre  
Day 2  
8:50 – 9:10**



## Case Study: Sterile Pharmaceuticals Production in Eritrea

Aimed at demonstrating the inter-connection between scientific knowledge and social development through healthcare, a case-study on the genesis and future state of Eritrea's Sterile Pharmaceutical production experiences and opportunities are reviewed. The history of sterile products manufacturing in Eritrea finds its roots in Orotta, Sahel. That was born out of necessity and a clear vision of EPLF's self-reliance. This talk will demonstrate the dedication and ingenuity of an EPLF's unit that enabled "cleanroom" processing in camouflaged underground houses in the valleys of Orotta. This talk will also shed light on the value proposition of an active business plan (future state) to develop internal capabilities for manufacturing high quality Large Volume

Parenteral LVPs), sterile drugs and vaccines. A mixed research methodology (qualitative and quantitative) was used to establish the values in societal well-being, technological advancement and economic development. Major findings of this research include, the viability of establishing a state-of-the-art factory that would produce high quality, high volume (fivefold) and affordable parenteral products. The net present value (NPV) analysis indicates that this investment plan is financially viable, with attractive return on investment while creating about 150 high-paying professional employment. More importantly the knowledge/technology transfer will provide hands-on training opportunities for professionals.

Bio: Option #1 (preferred option)

Abraham Bahre Woldu, PhD. is a Principal Scientist at Merck & Co, located in PA, U.S.A. During his 20+ years in Pharm R&D, he played key roles in the development and commercialization of multi-billion-dollar pharmaceutical products that include LAGEVRIO®, ISENTRESS® HD, DIFICID®, PREVYMIS™, Zytiga®, XARELTO®, NUCYNTA® ER, and Edurant®. Abraham obtained his PhD in pharmaceuticals from University of London, UK in 2002. His research covers a wide range of pharmaceutical subjects and has been published in various journals that include Advanced Powder Technology, J Pharm Sci, Int J Pharm, J Pharm Pharmacol, Eur J Pharm Biopharm, and Eur J Pharm Sci. He is an author of several

patent applications, and he has travelled extensively across Americas, Europe and Asia to transfer knowledge and technologies. Abraham is one of the 2022 winners of “Heros of Chemistry” Award, the American Chemical Society’s highest honor for industrial chemical scientists.

Bio: Option #2. (only if shorter version is needed)

Abraham Bahre Woldu, PhD. is a Principal Scientist at Merck & Co, located in PA, U.S.A. During his 20+ years in Pharm R&D, he played key roles in the development of multi-billion-dollar pharmaceutical products that include LAGEVRIO®, Zytiga®, and XARELTO®. Abraham obtained his PhD in pharmaceuticals from University of London, UK in 2002. His research covers a wide range of pharmaceutical subjects and has been published in various journals that include Advanced Powder Technology, J Pharm Sci, and Eur J Pharm Biopharm. He is an author of several patent applications, and one of the 2022 winners of “Heros of Chemistry” Award, the American Chemical Society’s highest honor for industrial chemical scientists.

## Non-Steroidal Anti-Inflammatory Drugs (NSAIDs): Usage and Co-Prescription with Other Potentially Interacting Drugs in Elderly: A Cross-sectional Study

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**Saloon Nakfa**

**Day 3**

**10:50 – 11:10**



Mr Nuru Abdu completed his Bachelor of Pharmacy in Orotta College of Medicine and Health Sciences in Eritrea. He is the manager of the Formulary Process and Pharmacoeconomics Section of the Medicines Information Services Unit/Pharmacy Services Division in the Ministry of Health. He has published more than 15 papers in reputable international peer-reviewed journals and has served as an editorial board member of PLOS ONE. Currently, he is a board member, Journal Editor-in-Chief, member of CPD accreditation body, and co-chair of the scientific committee of the Eritrean Pharmaceutical Association (ERIPA), as well as an active reviewer for more than 20 international peer-reviewed journals. He recently won the National Pharmacovigilante Award for the best reporter of Individual Case Safety Reports and has participated in four local and international conferences as a research presenter. Additionally, he serves as the secretary of the Eritrean National List of Medicines Review Subcommittee. Nuru Abdu formerly worked as a chief pharmacist in Adi-Tekelezan Community Hospital and an administrator in Mussa-Ali Community Hospital. His research areas include but not limited to antimicrobial resistance, geriatrics, public health, drug use evaluation, pharmacy practice, patient-related outcomes, and pharmacology.

**Background:** Globally, non-steroidal anti-inflammatory drugs (NSAIDs) usage in the elderly with chronic pain

has been reported as frequent. Though it is fundamental in maintaining their quality of life, the risk of polypharmacy, drug interactions and adverse effects is of paramount importance as the elderly usually require multiple medications for their co-morbidities. If prescriptions are not appropriately monitored and managed, they are likely to expose patients to serious drug interactions and potentially fatal adverse effects. Thus, the objective of the study was to assess the appropriateness of NSAIDs use and incidence of NSAIDs related potential interactions in elderly.

**Methods:** An analytical cross-sectional study was conducted among elderly out-patients (aged 60 and above) who visited three hospitals in Asmara between August 22 and September 29, 2018. The sampling design was stratified random sampling and data was collected using a questionnaire, by abstracting information from patients' clinical cards and prescriptions and screening drug-drug interactions using US FDA drug interaction checker ([www.drugs.com](http://www.drugs.com)). Descriptive and analytical statistics including chi-square test and logistic regression were employed using SPSS.

**Results:** A total of 285 elderly respondents were enrolled in the study with similar male to female ratio. One in four of all respondents were chronic NSAIDs users, of which 74.6% were not prescribed prophylactic gastro-protective agents (GPAs). About 20% of the elderly were involved in polypharmacy and

nearly all of the encountered potential NSAIDs related interactions (n=322) with prescribed drugs were moderate. Diabetes and hypertension were significantly associated with chronic NSAIDs use (OR=3, 95% CI: 1.54, 5.84; OR=9.99, 95% CI: 4.46, 22.38) and incidence of drug interactions (OR=3.95, 95%CI: 1.92, 8.13; OR=3.12, 95%CI: 1.81, 5.33). While diabetes and cardiac problem were significantly associated with incidence of polypharmacy (OR=4.33, 95% CI: 2.36, 7.96; OR=3.56, 95% CI: 1.05, 12.11).

**Conclusion:** Though the overall reflection of prescription pattern of NSAIDs during the study period was almost satisfactory, gastro-protective agents were poorly prescribed as a prophylaxis for these chronic NSAID users (> 3 months).

**Keywords:** chronic NSAIDs users, drug interactions, non-steroidal anti-inflammatory drugs.

## Potentially Inappropriate use of Medications and its Determinants among Geriatric Outpatients in Six Community Chain Pharmacies in Asmara

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**Saloon Nakfa**  
**Day 3**  
**9:10 – 9:30**



Mr Saleh Idrisnur is a regulatory affairs officer, public health researcher and pharmacist by training within the National Medicines and Food Administration. Currently, he is a board member of the Eritrean Pharmaceutical Association. He serves as chairperson of the membership committee and member of the scientific committee. His research works focus on antimicrobial resistance, drug utilization, geriatric pharmacology, and quality of life. Saleh's works has been published in several international journals; and is a peer reviewer for BMJ Open and PlosOne among others.

**Background:** Potentially inappropriate medications (PIMs) use is one of the main drug-related problems encountered in the elderly. It is associated with adverse drug events, morbidity, mortality, increased economic costs, and negative effects on the quality of life that requires strict monitoring of prescriptions in older people. Thus, the aim of the study was to assess potentially inappropriate medication use and its associated factors among geriatrics.

**Methods:** A retrospective cross-sectional study was conducted among all elderly outpatient prescriptions (aged 65 and above) in six community chain pharmacies in Asmara, Eritrea. Data were collected between June 16 and July 16, 2023. PIMs were detected using the 2023 American Geriatric Society (AGS) Beers Criteria®. Descriptive statistics and logistic regression were performed using IBM SPSS® (version-26).

**Results:** A total of 2680 elderly outpatient prescriptions were included in this study. The prevalence of PIM was 18.1% (95%CI: 16.7, 19.6). Moreover, a total of 470 medications were found to be avoided in older adults. The most commonly prescribed PIMs were sulfonylureas (27.2%) and substituted alkylamines (16.2%). The prevalence of prescriptions containing medications to be used with caution in older adults was 13.2% (95%CI: 12.0, 14.5). Age (AOR=0.98, 95%CI: 0.97, 0.99), polypharmacy (AOR=2.77, 95%CI: 1.49, 5.15), and general practitioner prescriber (AOR=1.38, 95%CI: 1.11, 1.70) were significant determinants of PIMs.

**Conclusion:** A considerable number of the elderly outpatients were exposed to PIMs which requires a close attention by policymakers, program managers, and healthcare professionals.

**Keywords:** geriatrics, potentially inappropriate medications, outpatient prescriptions, sulfonylureas, substituted alkylamines

# Self-Medication with Ophthalmic Drugs and its Associated Factors among Ophthalmic Patients

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**Saloon Nakfa**  
**Day 3**  
**9:10 – 9:30**



Mr. Senai is a lecturer, researcher and clinical pharmacist at Orotta College of Medicine and Health Sciences. He has earned both his BPharm and MPharm; with a great distinction from Asmara College of Health Science in 2014 & 2019 respectively. and Health Sciences as a lecturer and researcher. He is also a member of different associations like Eritrean Pharmaceutical Associations (ERIPA), Eritrean Pharmacist Connections (EriPiCo). He has published

several research papers. His researches mainly focus on clinical pharmacy, pharmacology, pharmacy practice, public health and general quality of health care.

Background: Globally, the practice of ophthalmic self-medication (SM) is a widespread issue. It can have adverse effects on the patients' visual outcome, due to a delayed diagnosis, inappropriate treatment, masking severe pathologies or causing side-effects, intoxication or harmful drug interactions. Despite a regulation that prevents SM with ophthalmic drugs launched on December, 2019, personal observations and anecdotal reports revealed that SM practice with eye medications still exists in Eritrea. Thus, the aim of the study was to assess the prevalence and practice of self-medication and its associated factors among ophthalmic patients.

Method: An analytical cross-sectional study was conducted among ophthalmic out-patients (aged 18 and above) who visited three hospitals in Asmara (the capital city of Eritrea) between September and December, 2021. A stratified random sampling design was employed and data were collected from September to December 2021 using an interview-based questionnaire. Systematic random sampling technique was used to get study participants to complete the questionnaire. The collected data were double entered and analyzed using CPro (v.7.2) and SPSS (v.26), respectively. Descriptive statistics and logistic regression were performed.

P-values less than 0.05 were considered as significant.

Results: A total of 351 participants were recruited with a response rate of 97.7%. The prevalence of self-medication with ophthalmic drugs (SMOD) was found to be 14.9% [95%CI (11.1, 18.7)]. The most frequently preferred ophthalmic drug groups were antibiotics (63.6%) followed by corticosteroids (22.7%). The main reasons for SMOD were easy accessibility (52.9%) and previous familiarity of the eye medication (27.5%). Eye redness (n=19/51) and foreign body sensation (n=18/51) were the most self-recognized complaints that required self-medication. The most common source of information for SMOD was pharmacy professionals (41.1%). Only attitude score (crude odds ratio (COR) = 1.25, 95% CI: 1.12, 1.39) was significantly associated with the practice of SMOD at bivariate logistic regression.

Conclusion: Though the majority of respondents considered self-medication with ophthalmic drugs as inappropriate, a significant number of them practicing it. This mandates relevant bodies to take stricter measures to protect the public from the misuse of eye medications.

Keywords: eye medications, ophthalmic drugs, ophthalmic patients, pharmacy professionals, self-medication

## Task Shifting: A Strategy that Improved Maternal Child Health Services Coverage in Eritrea

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**Saloon  
Dekemhare  
Day 1  
2:30 – 2:50**



Reducing maternal mortality and providing universal access to reproductive health in resource poor settings has been severely constrained by a shortage of health workers required to deliver interventions (WHO 2006).

Alongside strategies to increase the numbers of well-qualified health workers in the system, countries also need to make more efficient use of the human

resources currently available and find ways to expand the total health workforce fast enough to respond to reduce maternal morbidity and mortality.

Task Shifting/Sharing is the name now given to a process whereby specific tasks are moved, where appropriate, to health workers with shorter training and fewer qualifications.

Eritrea has been using Task Shifting/ Sharing in its Health System during the armed struggle for liberation, though the term “Task Shifting” may not have been used.

Eritrea is one of the countries with severe shortage of high-level health personnel in line of maternal health. A strategy of Task Shifting was thus chosen, and under the Safe Motherhood (SMH) program, Eritrea initiated the Life Saving Skill (LSS) training to nurses and midwives in 2000.

Life Saving Skills that were Task shifted include:

Evacuation and Curettage of Products of Conception

1. Manual Removal of Retained Placenta
2. Assisted Vacuum delivery
3. Administration of Uterotonic and Anticonvulsant drugs

Between 2005-2023 about 4457 midwives, nurses and associate nurses were trained with LSS.

Furthermore, an abridged course of training to perform Caesarian Section and other Emergency Obstetric Procedures to New Graduate General Prac-

tioners (GP) was initiated in 2010. Since then,110 GPs were trained and are practicing in the different Zobas of the country.

Impact

1. Eritrea has made considerable progress in improving reproductive, maternal, new born, child and adolescent health in the last three decades. Maternal mortality ratio per 100,000 live births had reduced from 1,590 in 1990, 579 in 2010, 441 in 2018 to 383 in 2021.

2. The number of community hospitals and regional hospitals providing comprehensive emergency obstetric and newborn care (CEmONC) increased from 9 in 2010 to 16 in 2023.

3. The HMIS 2018 data reveals that the total national figure for the C/S performed was 3.8%, whereas in 2020 it has been reached at 6.5%, which showed a 2.7 % increment. Thus, the overall trend may indicate improved access to required C/S.

Conclusion

Though the improvement in the socio-economic status of the country in general, and the health system in particular is the overall reason for such a success in reducing Maternal Mortality and Morbidity, the strategy of Task Shifting gets the highest credit as it targets the most important and scarce commodity, which is the Trained Human Resource.

Keywords: Eritrea, human resources, maternal mortality, safe motherhood, task shifting, universal access.

# Total Phenolic Content and Antioxidant Activity of Spanish Sage

\* Yemane

Habtemichael Gebremeskal (International Research Center “Biotechnologies of the Third Millennium” ITMO University, Saint Petersburg, Russia)

\* Liudmila A. Nadtochii (Saint Petersburg State Chemical and Pharmaceutical University, Saint Petersburg, Russia)

\* Nina G. Kazydub (Omsk State Agrarian University named after P.A. Stolypin, Omsk, Russia)

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**Saloon  
Massawa  
Day 2  
5:10 – 5:30**



Mr. Yemane is a PhD candidate in Food Biotechnology and Food Chemistry at ITMO University, Saint Petersburg, Russia. Yemane’s research expertise focuses on the development and utilization of plant-derived nutrients and bioactive compounds, with a par-

ticular emphasis on their integration into food products and medicinal applications. He holds a Master of Science in Bioscience for Sustainable Agriculture from Silpakorn University, Thailand (2017), and a Bachelor of Science in Applied Chemistry from the University of Asmara, Eritrea (2006). He mentors students at ITMO University and has lectured at Hamelmalo Agricultural College. Yemane is involved in the NIRMA Project, the Science Mentor Project, and has contributed to the FAO’s food safety initiatives in Eritrea “Capacity Strengthening on Food Safety Control Activities in Eritrea”. He has authored over 17 articles in top-tier journals, spoken at more than 10 international conferences, and received several honors, including the 3rd Prize at the International Conference PNRPU in Perm, Russia in April 2024. Additionally, he was awarded a Very Great Distinction and an Excellent Thesis award for his Master’s degree. He has also been awarded scholarships from the Russian Federation in 2021 and the Thailand International Cooperation Agency (TICA) in 2015.

Spanish Sage (*Salvia hispanica* L.) is an annual herbaceous plant belongs to the Lamiaceae family. Considering the consumer’s interest in healthy and nutritious foods, the cultivation of Spanish Sage crop has been globally extended. The current study consists in the creation of introduced varieties of Spanish Sage in the Russian Federation and the interrelation of environmental factors of southern forest-steppe of Western

Siberia. This crop has been cultivated in Mexico since ancient times, while in Russia it has not been grown yet. Until the present, numerous previous studies have focused on the study of a single morphological part of Spanish Sage plant and especially on the seeds, sometimes on leaves and never on stems. The objective of this study was to determine the total phenolic content (TPC) and its antioxidant activity of Spanish Sage Seeds, Stems and Leaves. The total phenolic content was measured by the Folin-Ciocalteu method with some modification to adapt the assay to 96-well microplates, using gallic acid as standard while the antioxidant capacity was based on the ability of these plant extracts to scavenge DPPH radical. 70% TPC methanol extraction and 70 % TPC ethanol extraction were compared, with exception of Spanish Sage seeds extracts significant differences were found in Spanish Sage leaves and Spanish Sage stems. High total phenolic content was detected in Spanish Sage leaves ( $9.183 \pm 0.0625$  mg GAE/g methanol extract and  $7.809 \pm 0.157$  mg GAE/g ethanol extract), more than 3.2-fold higher than previously reported, followed by Spanish Sage Stems ( $7.819 \pm 0.225$  mg GAE/g methanol extract and  $6.695 \pm 0.626$  mg GAE/g ethanol extract) for the first time determined, and Spanish Sage Seeds ( $1.669 \pm 0.079$  mg GAE/g methanol extract and  $1.614 \pm 0.040$  mg GAE/g ethanol extract) higher than previous report. Spanish Sage Leaves (92.24%) exhibited the strongest antioxidant ca-

capacity followed by Spanish Sage Stems (74.43%) and chia Seeds (41.35%). Indeed, 70% ethanol and 70% methanol extracts showed similar DPPH scavenging activity. It can be concluded that the surveyed parts of the Russian-Siberia grown Spanish Sage plants could be potential sources of high phenolic content and antioxidant agents.

Keywords: Antioxidant Activity; Spanish Sage; *Salvia hispanica* L.; Solvent Extraction; Total Phenolic Content.

## Traditional Inoculation Practices in Eritrea

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**Saloon Nakfa**  
**Day 3**  
**10:30 – 10:50**



Prof. Tadesse Mehari holds BSc in Biology, MSc in Microbiology and PhD in Biotechnology. He has extensive experience in education, both in schools and in university. His experience includes working as school teacher, university lecturer, Director of Academic Affairs (UoA), Acting President (UoA), and Executive Director (NCHE). He as an advisor for over 15 MSc and 5 PhD

students. Currently, he serves as a “Reviewer” for over 35 Regional and International Journals.

One of the most conspicuous developments of Biotechnology during the last few decades is its potential in improving human health. The mechanisms of developing vaccinations through the application of biotechnology can be considered as the most prominent invention to date. Disease prevention is the most convenient and highly effective approach to promoting human health and prolonging life.

Vaccinations have prevented millions of deaths worldwide and diseases that used to kill, disable or debilitate millions of people are either gone or seen very rarely. Many diseases, which were causing great havoc to the world population have been reduced by up to 99.9% since their vaccines were introduced. Vaccinations currently prevent 2-3 million deaths a year. If, on the other hand, people stop having vaccines (vaccine hesitancy), infectious diseases can quickly spread again.

Before the advent of the modern vaccination practices, traditional societies in different parts of the world have been applying their own methods of preventing infectious diseases before causing serious damage to their societies. The general principles of such traditional inoculation practices when compared with the modern techniques of vaccination are very similar and apply the same scientific justification.

The most prominent traditional practices have been documented in Asia (India and China), North Caucasus, America (USA), Europe (England and

France), and Africa (Eritrea, Ethiopia, Ghana and Nigeria, among others. The various traditional inoculation practices undertaken in these and other regions of the world, including Eritrea will be reviewed. More importantly, the various articles contained in the “Eritrean Customary Laws” pertinent to the isolation of infected persons (‘wusheba’) to prevent the spread of contagious diseases and the different types of inoculation practices, especially the unique traditional practices undertaken to prevent measles, before the advent of modern vaccination, will be discussed. Review of such traditional practices shall, therefore, help us to justifiably conclude that these traditional practices have, in a variety of ways, led and contributed to the invention of the modern techniques of vaccination being practiced nowadays.

Keywords: Traditional inoculation, vaccine, vaccine hesitancy, quarantine, ‘wusheba’, variolation, customary laws.

# Using the WHO Individual (NMCR) Cycle to Improve Emergency Obstetric Care and Maternal Outcome in Keren Hospital

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**Saloon  
Dekemhare  
Day 1  
3:10 – 3:30**



## Background

In 2016, the WHO regional office for Europe prepared a manual for conducting routine facility-based individual near miss case review cycle. This study evaluates the effectiveness of the near miss case review (NMCR) cycle in improving quality of emergency obstetric care and maternal outcome in Keren hospital.

## Methods

We used interrupted time series (ITS) design to evaluate the association between the NMCR cycle and improvements in quality of care. The study period extended for 55 months (33 months before and 22 months after intervention). The monthly number of women

who experienced potentially life-threatening condition (PLTC) was used as a denominator for calculating selected outcome measures.

Accordingly, the proportion of women with PLTC who experienced (a) substandard care (b) delayed care and (c) severe maternal outcome (SMO) were the three outcome measures used for this study. All statistical analyses were performed using STATA 14.

## Results

A statistically significant reduction in the overall proportion for all outcome measures was observed in the post-intervention period compared to the pre-intervention (4.53% vs. 13.39% for SMO; 50.84% vs. 59.6% for delayed care; 24.38% vs. 29.96% for substandard care). In the first month of the intervention the percentage of women with SMO significantly decreased by 4.75% (95% CI: -6.95 to -2.54,  $p < 0.001$ ). This was followed by a significant monthly decrease in trend of 0.28 percentage points per month (95% CI: -0.37 to -0.14,  $p < 0.001$ ) relative to pre-intervention. The proportion of women who received delayed care also showed a significant 7% (95% CI: -9.28 to -4.68,  $p < 0.001$ ) decrease in the post-intervention level compared to the pre-intervention. However, there was no significant change in the slope of the regression line in the post-intervention period. We also observed a 3.50% (95% CI: -4.74 to -2.26,  $p < 0.001$ ) significant drop in the level of substandard care. Moreover, the post-intervention trend decreased

significantly by 0.21 percentage points (95% CI: -0.28 to -0.14,  $p < 0.001$ ) per month compared to the counterfactual.

### Conclusions

Our findings suggest that the WHO NMCR cycle was associated with substantial improvements in quality of care and maternal outcome. The intervention is cost-effective and can easily be tailored for use in resource-poor settings of developing countries.

Keywords: interrupted time series, near miss case review, post-intervention period, pre-intervention period, maternal outcome, obstetric care

## Water Pollution with Heavy Metals and Human Health Risk Assessment

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**Saloon  
Massawa  
Day 2  
9:00 – 9:30**



Dr. Zerabruk is currently working as Assistant Professor of Community Medicine at the College of Medicine and Health Sciences. He is a President

of the Eritrean Public Health Association. His PhD Research topic was “Quality Analysis of Asmara City Drinking Water and Human Health Risk-based assessment of its Hazardous Pollutants”. His research interests is mainly on Drinking water quality and Food safety issues.

Background: In the present study sediment and water samples collected from Mainefhi and Toker reservoirs supplying drinking water to Asmara city (Eritrea) were analyzed for the concentration levels of the heavy metals Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb and Zn using Flame Atomic Absorption Spectrometry.

Results: The mean concentration levels of heavy metals in the water of Mainefhi reservoir: Cd 0.0035 mg/l, Cr 0.028 mg/l, Cu 0.004 mg/l, Fe 0.242 mg/l, Mn 0.065 mg/l, Ni 0.011 mg/l and Zn 0.016 mg/l. Similarly, the concentration levels for the water of Toker reservoirs: Cd 0.001 mg/l, Cr 0.017 mg/l, Cu 0.011 mg/l, Fe 0.165 mg/l, Mn 0.096 mg/l, Ni 0.007 mg/l, Zn 0.016 mg/l. All the mean concentration values of the heavy metals, were below the WHO guideline limits for drinking water, excluding Cd in Mainefhi reservoir, which is of higher value than WHO value. Co and Pb were not detected in the water samples of both reservoirs. The mean concentrations of the heavy metals in the sediment of Mainefhi were Co 0.790 mg/l, Cr 14.607 mg/l, Cu 8.167 mg/l, Fe 11,421.9 mg/l (1.142%), Mn 87.254 mg/l, Ni 4.539 mg/l, Pb 1.752 mg/l and Zn 5.769 mg/l. Analogously, the levels of heavy metals in Toker sediment Cd 0.005 mg/l, Co 33.860 mg/l, Cr 252.598 mg/l, Cu 83.396 mg/l, Fe 87,502.6 mg/l

(8.752%), Mn 1455.746 mg/l, Ni 87.806 mg/l, Pb 5.005 mg/l and Zn 88.936 mg/l. The mean concentration levels of Mainefhi sediment were below the consensus-sediment quality guidelines of NOAA. Moreover, Cr, Fe, Mn, and Ni were above the consensus-sediment quality guidelines of NOAA for Toker sediment. Four different methods of assessment of the accumulation and contamination status of the sediment of heavy metals were applied. The Geo-accumulation index (I-geo) and Contamination factor (CF) results indicated that Mainefhi sediment was unpolluted (I-geo  $\leq 0$ , CF < 1), while the Toker sediment was moderately polluted for Co, Cr, Cu, Fe and Mn (I-geo 0-1, CF 1-3). The contamination degree (CD) calculations also showed that Mainefhi sediment was not contaminated while Toker sediment was in the 'moderate contamination degree' (CD 6-12). Enrichment factor (EF) values for sediments of both Mainefhi and Toker reservoirs (EF < 2) indicated there was little or no influence by anthropogenic input in regard to the measured heavy metals.

**Conclusion:** Strong positive correlation exists between the mean concentration of the heavy metals in the sediment and water of both reservoirs. A Pearson's correlation result gave  $r = 0.97$ ,  $n = 9$ ,  $p < 0.01$  for Mainefhi reservoir and  $r = 0.86$ ,  $n = 9$ ,  $p < 0.01$  for Toker reservoir.

**Keywords:** Sediments, water reservoirs, geo-accumulation index, enrichment factor, contamination factor, contamination degree

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## Politics

### Post-conflict State-building and Eritrean Developmental-state Experiment: Between Coloniality and the Struggle for a Decolonial State-building

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**Saloon  
Akurdet  
Day 2  
3:00 – 3:30**

This paper seeks to generate insight and make sense of a state-building project in Eritrea. My preoccupation in this has been with the necessities of understanding and interrogating the challenges of state formation in Africa. It is common to point finger at legacy of colonialism for the creation of weak states in Africa; many also point out the neo-colonial domination and interferences along with series of conflicts. These too are compounded by elites who suffer from the Fanonian-trap. State institutions in Africa are thus struggling to be transformative; in many instances, they continue to

(re)produce dependency on their former colonial masters and institutions created to facilitate their domination.

The question I raise is, how is Eritrea navigating these in its post-conflict state-building experiment? As a late comer, Eritrea had an opportunity to learn from failures and mistakes of “decolonised” states in Africa. Having gone through 30 years of struggle for independence has also created serious gaps in all sectors, devastated economy, with high hopes, demands, and expectations. This paper outlines four fundamental issues: 1) Eritrea as post-conflict state-building and developmentalist experiment; 2) What this means as a post-colonial state-building project within difficult global and geopolitical contexts; 4) How this state-building is (mis)read and (mis)understood, and the production of knowledge about it; 4) lastly, what lessons is there to draw from these experiments. This paper frames these within decoloniality approach to thinking about state forms and national projects. This paper argues that features of Eritrea’s state-building project exhibit characteristics of a struggle for decoloniality, and this is undertaken within the context of global neoliberal hegemony that is hell-bent on weakening the state as institution everywhere.

Keywords: colonialism, global and geopolitical contexts, state-building, neo-colonial domination, neo-colonial interferences

## Self-reliance Under the Present Global Power Asymmetry

\* Amanuel Garza

**Saloon  
Dekemhare  
Day 2  
10:50 – 11:10**

Problem/Motivation

The geopolitical position of Eritrea had always attracted the attention and interest of great powers and regional forces. Eritrea has been a subject of these interests for over eighty years and as a result was forced to pay heavy human and economic price to achieve its national independence and maintain its Sovereignty.

Furthermore, despite Eritrea’s intent to foster an environment of peace and cooperation in the region, partly due to its strategic geopolitical position in the horn of Africa and partly due to the neighbouring countries’ internal crisis and instabilities, Eritrea has not been able to escape the negative effects of these forces on its development.

The weaponisation of economic power by the West under the current asymmetry of economic, technological, and financial power, in a world that is intricately interlinked, has been used, contra international law to subject many countries, including Eritrea to submission to the Western geopolitical and economic interests through a series of embargoes.

Although the Western Economic and

political power is waning due to the internal crisis within these countries and the emergence of a multipolar world, the global economic, financial, and technological power and network is still dominated by the West. Furthermore, the multipolar world does not on its own guarantee the economic and political freedom of many countries. The question Eritrea is facing today is that, under the current global asymmetry and regional instabilities, what is the alternative pathway to self-reliance that would be able to ensure a national economy that is resilient, national sovereignty and security and a social system that is just?.

#### Key questions and analysis

Finding an alternative path of development requires an understanding of the nature of the economic, political, and cultural conditions that makes the domination possible. Therefore, the current asymmetry and weaponisation of economic power, would require the analysis of the relationships of domination. This analysis should not be restricted narrowly to economic matters, since the conditions that makes the domination possible is constituted not only in the economic but political, technological, military, and cultural domains.

At the fundamental level what constitutes this domination is the network of active relationships in the domains of economic, financial intellectual and cultural activities that operate in and through daily asymmetric exchanges. This power and dominations are an emergent phenomenon from this network of daily relationships of desire and exchange.

Domination here is not given, but emergent from the network of daily relationships of desire and exchange constituted by those dominating as well as dominated. As the network of relationships that emerge into domination are driven by the desire to consume, the network of relationship that will disrupt it is also driven by the desire of freedom.

Today the US and its Western allies although constituting a fraction of the world population, are weaponizing these wide and expansive networks of asymmetric relationships of exchange and desire to dictate the rules of the game in conducting an order that conforms to their economic and geopolitical interest and punishing 'deviant' behaviours that are conceived as a threat to this.

Understanding domination and its current overt and covert operationalization through embargoes and sanctions through the lenses of these network of relationships of exchange and desire is critical to the project of freedom.

#### Modalities

In the context of the above analysis of the existing global asymmetry and its mechanism of operation, the advocacy for 'poor' countries to scramble a place in the existing global value chain by western countries and international financial and development institutions is futile. This economic model and strategy, development through subscribing into the global value chain propagated by ideologues of the free market, would neither guarantee economic freedom nor national sovereignty. The model of economic development through participating in the existing global value chain will perpetuate the Western economic

and by extension political and military hegemony and maintain the existing global asymmetry.

Under the present global and regional asymmetry Eritrea should forge a self-reliance strategy in the national economy and security and foster a strong economic and political regional cooperation with its neighbouring countries.

On the national economy this would entail building a national innovation system that prioritises food self-sufficiency through agricultural transformation, diversification through agri-business, Industrial policy that focuses on commodity based green industrialisation, the development of natural renewable energy and the fostering of culture based and locally driven tourist industry.

These strategies would be difficult to sustain without the mobilisation of Eritrean human resources. The conditions for population growth and skills formation are critical in this endeavour. Eritrea, although economically small is a country with huge asset in social and cultural capital. Eritrea can deploy these historical strategic advantages and build innovative institutions to mobilise its people inside and outside Eritrea to build a national economy that is resilient, a socially just system and maintain its national independence and sovereignty.

Keywords: economic power, geopolitical position, global asymmetry, multipolar world, self-reliance

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## Regional and International Affairs

### Africa's Agency in a Shifting Global Order

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**Selam  
Conference  
Centre  
Day 1  
12:10 – 12:30**

The paper seeks to understanding to what extent the plurality of African actors' responses/positioning vis-à-vis the Russia-Ukraine war confirms a retreat from the international (Western-led) rules-based order?

Is this indicative of a broader trend towards the emergence of regional orders that ultimately will bring together a constellation of regional orders? Or will we be witnessing a widening gap that will inevitably lead to the emergence of parallel regional orders with no consensus regarding the norms, practices and institutions that would result in a global order?

The paper starts from the assumption that the current juncture begs for scholarly engagement with the visions of actors from the Global South in working towards the emergence of an alternative global order. Indeed, the divergence between actors from the Global South and the Global North concerning the response to the Russia-Ukraine war has deepened the gap between the two.

African international society's prevailing pluralism over solidarism and the lack of a unified foreign policy orientation vis-à-vis external actors weakens the negotiation capacity/leverage of African actors at this critical juncture. The resurgence of great powers' rivalry has implications for the African security landscape as we have witnessed with more intensity in the Horn of Africa.

The paper seeks to understanding how African actors engage with and envision the decay of the western-led international order as an opportunity for the emergence of a more just global order.

Keywords: Global North, Global South, pluralism, regional orders, Russia-Ukraine war, solidarism.

## Africa: Its Prospective Opportunities and Challenges under the Changing Global Order

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**Saloon  
Dekemhare  
Day 2  
11:10 – 11:30**



Miriam Yosief is was born in 1992. She studied land resource and environmental science in Hamalmalo agricultural college and graduated in 2015. She worked as graduate assistant in Hamel-malo Agricultural College from 2015-2019.

She possesses post-graduation diploma in Natural Education in 2029-2020. She is currently working in the office of people's front for democracy and justice- department of political affairs. Miriam sees this platform as a turning point to her long term plans of expanding my interest in the following research areas: contemporary issues of climate

change and their impact in the sub-Saharan region, redefining African future under the changing global order, and strengthening organizational structures in addressing gender mainstreaming.

Africa, being the second largest continent in the world has been under all forms of exploitation for centuries. The first scramble for Africa among the major European powers that was held in the late nineteenth century led to the invasion and occupations of most African territories. This colonial rule lived around hundred years and left a profound contusion and impacts that continues till today.

After being freed from colonization, the economy of most African countries remained largely unchanged in the post-colonial era as neo colonialisms took over. Neo colonialism, might nominally let countries to achieve political independence however hold control of their economy. This apparently proves the presence of indirect political power and hegemonies over the third world countries in general and Africa in specific.

African countries had begun to implement free market reforms in 90s and 80s. However, that opening up engaged Africa in trade and investment, but it failed to get it out of poverty and underdevelopment. Even though there is an extensive literature on the cause of Africa's underdevelopment, the main contributing factors goes to the impacts of colonial policy that left the continent with corrupted political elites, depen-

dency culture, and socioeconomic inequalities. This along with other the prominent factors of the western hegemonic policies caused continuous political instabilities, unsettled conflict and poverty in Africa.

Under the changing trends of the current global order, with features of a power shift from west to east and the end of the unipolar system, there has been a massive rise of interest in engaging Africa with the major rising world powers. Africa-China, Africa-Russia, Africa- Europe, and soon are among the main current diplomatic engagements that have gained a revealing attention.

This paper, tries to discover some undeniable facts. The fundamental questions remain to lie on how and what will Africa benefit from the changing global politics in general and the rising interest of the world for the engagement of Africa. The political and economic competence of today's Africa will determine if African countries can come up with smarter and workable strategies that enables them to gain a shared and mutual benefit that is free of exploitation and dominance. Failing to address this fact might leave Africa for a new scramble.

Keywords: Africa, colonial rule, hegemony, global politics, neo colonialism, political power, post-colonial era,

## Emerging Geopolitical Alliances: Whither Africa

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**Saloon  
Dekemhare  
Day 2  
10:30 – 10:50**



Lambert Ebitu is a Political Affairs Analyst specializing in African geopolitical dynamics and pan-African issues. Based in Uganda, he has been featured on RT media and published widely in Uganda's mainstream media on political affairs. He frequently contributes analyses on pan-African topics with Africa Interest media, where he explores Africa's evolving role within global alliances. His work brings a critical perspective on the socio-political trends shaping Africa's future within the context of multipolarity.

Africa is at a crossroads, caught in the crosshairs and crossfire of competing Eastern and Western power alliances, prompting the question: Whither Africa? This his paper delves into the strategic motives, narratives, and geopolitical dynamics influencing Africa's capacity to transcend its objectification and assert its agency on equal, and even supe-

rior, terms with global powers. It posits that Africa's path forward does not lie in alignment with either the East or the West, but rather in the pursuit of a federal African State, echoing the visionary stance of Kwame Nkrumah.

Drawing upon historical precedents and contemporary geopolitical analyses, this paper argues that alliances with global powers, including the recent phenomenon of BRICS, undermine Africa's longstanding imperative for integration. Despite perceived benefits, these alliances perpetuate an economic order reliant on Africa's subordination. Consequently, recalibrating Africa's status—embodied by the adoption of a single African currency, establishment of a unified continental army, and a common foreign policy—has the potential to disrupt the global equilibrium significantly. This not only offers opportunities for oppressed peoples in the Global South but also challenges capitalist exploitation worldwide.

Through qualitative analysis and case studies, this paper examines successful instances of regional cooperation and integration, distilling key factors underpinning their effectiveness. Furthermore, it assesses the ramifications of Africa's inward focus on global power dynamics and offers actionable recommendations for policymakers and stakeholders alike. Ultimately, this paper contends that Africa's destiny hinges not on external alliances but on its proactive measures to assert agency and chart its own course forward.

Keywords: Africa; Geopolitical dynamics; BRICS; Integration; federal African State.

## Eritrea's Counter-Hegemonic Foreign Policy in the Changing International System

\* Biniam Berhe (Eritrean Mission to African Union, Addis Ababa)

**Saloon Nakfa**  
**Day 2**  
**9:10 – 9:30**



## Ethnic Democracies: An Examination of Governance in Ethiopia's Ethnic Federalist State and its Implications

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**Selam Conference Centre**  
**Day 1**  
**3:00 – 3:30**



What are the consequences of organizing a political system around ethnicity? Continued destabilization in Ethiopia, beginning with the Oromo youth movement around 2015 and culminating in a war with Tigray, has roots deep within the creation of the Ethiopian state.

In this article, I contextualize ethnic federalism as a historical solution to govern a post-war multi-ethnic nation and a proximate cause of political dysfunction. Drawing on the work of Lijphart (1977), Mamdani (2001), and Chandra (2005), I compare Ethiopia to other global cases with highly politicized ethnic cleavages such as Rwanda and India.

In my work, I offer an analysis of recent political violence (2015-2021), to argue that continued political crises, violent conflict, and separatist movements are not isolated and unexpected. Rather, they are logical outcomes of a system based on competing ethno-nationalisms that rewards regional homogeneity and increases the salience of ethnic identity in politics, turning all tasks of governance into sites of ethnic competition and strife. I then turn to reviewing alternative systems of political organization and the broader implications of Ethiopia's ethnic federalism in a global perspective.

Keywords: ethnicity, ethnic federalism, global perspective, political dysfunction, post-war multi-ethnic nation.

## **Deeper Economic Integration in the Intergovernmental Authority on Development: An Answer to the Unending Security Upheavals in the Region?**

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**Saloon  
Massawa  
Day 3  
9:10 – 9:30**

The Intergovernmental Authority on Drought and Desertification (IGADD), after it transformed itself into a regional block under the name The Intergovernmental Authority on Development (IGAD) in 1996, it made one of its primary objectives to promote economic integration and conflict prevention in the region. Economic integration is one of the major areas of International Economic Law (IEL), thus, it is IEL that provides economic integration principles, laws and rules governing economic integration. As a result, there exists a complex relationship between economic integration and peace and security. IGAD, overwhelmed by regional conflicts, has forgotten that not only does

economic integration remain amongst its primary objectives, but it might also be the key to a sustainable peace in the region.

This study will address the relationship that exists between economic integration in the region and investigate how- if harnessed well- it can be one of the main means of promoting peace and security in the region. The researcher makes a comparative analysis in addressing integration challenges in the region and on how to develop proper integration.

Keywords: IGAD, IGADD, conflict prevention, economic integration, integration challenges, peace, security .

## **Geo-political Rivalry among External Powers, Governance Deficiency and Conflicts in the Horn of Africa**

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**Saloon  
Massawa  
Day 3  
8:30 – 8:50**



Melake Tewolde is Assistant Professor in the Department of Economics and Finance at the College of Business and Social Sciences, Adi-Keih. He earned his Ph.D. from University of Tilburg and has career in academy that spans for more than 40 years. He served for several years as Head of Department. Currently he is working as Director of Administration and Finance in addition to his teaching and research activities. He has published several articles with main focus on sustainable development.

The Horn of Africa is hemmed by large bodies of water; the Nile River in the West; the Red Sea in the North, and the Indian Ocean in the East with the Red Sea and the Indian Ocean defining the clusters of maritime limits. The region is endowed with diverse natural resources such as vast arable land, marine resources, water, livestock resources, wildlife and various energy resources such as oil and gas reserves, hydroelectric, solar and geothermal. As a result, the Horn of African countries are center of gravity of external powers, and the external powers have been manipulating the deficiencies in their governance systems which deepen polarization of political groups periodically; ignite ethnic-based and religious conflicts and interstate conflicts.

Over the past seven decades, the meddling of external powers in the Horn of Africa have never been as part of their constructive international cooperation to contribute to regional peace, the development humanity via building human capital, national capacity-build-

ing, employment creation, and transfer of technology that contribute to inclusive-economic growth and poverty eradication. Based on their geopolitical calculations, the US-led global powers have particularly continued to meddle in the internal affairs of the Horn of African countries with the objective of dominating the region by incorporating the countries into Western-styled governance system that promote neo-liberalism that would enable their natural resource-seeking multinational corporations to dominate and exploit their natural resources. Recently, the emergence of Middle Eastern and Gulf states as key powers in the Horn of Africa has increased with varied economic and political interests. Moreover, major Asian powers have also established significant security engagements in and around the Horn of Africa as part of Indo-Pacific security strategies. Djibouti has particularly remained militarily congested, with foreign forces from the United States, France, Germany, Japan, and China, complicating the security and stability of the region. The ongoing civil war in the Sudan and the rhetoric and defunct Ethiopian empire projecting its power on sovereign neighboring countries in the region and the Hamas-Israel war has ramifications on the Horn of Africa stability. The Horn of Africa region is facing higher risk of a wider regional conflicts due to geopolitical competition among the different tiers of external powers and behavior of some servitude states of the West which promote Western agenda. This is be-

cause Conflicts in any one country in the Horn of Africa is likely to spillover to neighboring countries because of the high degree of interdependence of the countries in the region. To date, the Horn of African countries are still suffering from conflicts of different scales and duration while their socio-economic progress remains far below the desired levels.

As peace is a requisite for wellbeing of populations in the Horn of Africa, the paper underpins that the main responsibility of the Horn of African countries is realization of social justice through self-reliant development by building their national capacities. Within this context, the overall objective of the study is to underpin the centrality of genuine regional cooperation among the Horn of African countries for transforming vicious cycle of conflict and underdevelopment to a virtuous cycle of regional peace and sustainable development. The specific objectives are:

- to analyses the development outcomes in the Horn of African countries that have been affected one way or the other by conflicts of different intensities;
- analyze the major driving forces of conflicts in the Horn of Africa; and
- suggest measures that would change the conflict trajectory in the Horn of Africa to durable peace and development trajectory.

Keywords: external powers, geopolitical calculations, global powers, Horn of Africa, internal affairs

## **Militarization of Political Power in the Sudan (1958-2021) and its internal and regional impacts**

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**Selam  
Conference  
Center  
Day 1  
5:30 – 6:00**

Military interventions into the politics of post-independent Sudan have been so overwhelming that they radically shaped the political practice, brought about militarization of political power and politicization of institutions including the army, contributed to regional disturbances, and ultimately led to the failure of state. During self-governance period (1953-1958) when modern democratic forces were trying to exercise democracy and civilian governance, traditional powers, Ansar and Khatmyyah, got resentful with such forces and urged military leaders to take power.

On November 17th, 1958, General Aboud toppled down the civilian government in a military coup, the first-time military stepped in politics.

Abood's positive response to the west temptations and his entire military approach to southern Sudan issue were, among others, causes to befall his regime by a political up-rise on October 21, 1964, following which, a civilian government was elected in 1965. However, having been supported by the communist party, General Nimiry threw over the elected regime in a military coup on May 25th, 1969. Nimiry's fluctuation between the west and the east and his failure to handle southern Sudan problem properly including its serious internal complications and regional impacts were factors behind the downfall of his regime before demonstrations of mass crowds on April 6th, 1985. Before the democratic regime elected in 1986 completed its first tenure, it was overthrown by General AL-Bashir military coup on June 30th, 1989. After accumulation of serious damages, failures, and grievances over thirty years of dictatorship, AL-Bashir regime was forced to step down by mass revolution in April 2019, and a transitional government was formed from both the army and civilian leaders.

Having been deeply rooted in politics, the army leaders never wanted to hand over power to the civilians, so they expelled the majority of the civilian ministers including the prime minister and detained them in a coup led by General AL-Burhan and General Himedti on October 25th, 2021.

Over seven decades of Sudan independence, the Sudanese army has been ruling the country for almost six decades. It has thus been conventionally incul-

cated in the minds of the army officers that their job is to rule rather than to defend the country! As they based strong dictatorships in Khartoum, all military governments were fronted by regional armed movements in southern Sudan, Darfur, Nuba Mountains, and the Blue Nile as well as civil opposition forces.

The internal political situation in Sudan often has regional dimensions and impacts. Khartoum cultural and geographical ties with both African and Arabic countries pose challenges for policy makers as to hold all these ties together in order to achieve stability and development for the country. For instance, the current issue of the Ethiopian Millennium Damp has placed Khartoum in a situation to be tightened from both sides of Cairo and Addis Ababa, and Khartoum-Asmara relationship is also affected accordingly. Regional armed movements in Sudan, too, often sought support from neighbouring countries that are not in good terms with Khartoum.

This paper assumes that militarization of power has been a major factor for the continuation of civil wars in Sudan and Khartoum failure to stand in the right place towards the regional issues on which it has impacts and by which it is influenced. The paper thus aims to answer the following questions:

- 1- How has militarization of power contributed to the failure of state in the Sudan?
- 2- What are the regional issues that have been affecting and affected by

Khartoum politics?

3- What would be the optimal situation whereby Khartoum would bring about stability and development in the Sudan and play a key role in the region stability?

Keywords: civil wars, militarization of power, neighbouring countries, regional impacts, Sudan.

## **Nexus between ethnicity and/or religious extremism and Nation Building in the Horn**

\* Mohammed Hasssan  
(Belgium)

**Selam  
Conference  
Centre  
Day 1  
3:30 – 4:00**

After obtaining his DPhil in Mathematics from the University of Oxford, Prof. Mohammed Hasssan returned to Sudan as Lecturer in the University of Khartoum, and later became Professor and Dean of the School of Mathematical Sciences. Prof. Hasssan has a long list of publications in Theoretical Plasma Physics and Fusion Energy; Wind Erosion, Dust and Sand Transport in Dry Lands. He also published several articles on STI in the Developing World.

## **Potential Contribution of BRICS to a New Global Order**

\* Zhang Yongpeng (Chinese Academy of Social Science)

**Selam  
Conference  
Centre  
Day 1  
11:50 – 12:10**

## **Prospects of Peace in Eritrea and Ethiopia: The Causes and Consequences of the Recent War in Tigray [2020-2022]**

\* Habteab Gebrekios Gebremicael (Higher Education and Research Institute, College of Business and Social Sciences)

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**Saloon Men-  
defera Day 2  
4:50 – 5:10**



Mr Habteab Gebrekiros is currently working in the College of Business and Social Sciences, Adi Keyih. He is servicing as Department Head of History and as a lecturer II. In 2018, he completed his M.Phil. in Interdisciplinary Social Science Studies at Makerere Institute of Social Research (MISR) Uganda. His research area of interest includes political history, diplomatic history and state-society relationship focusing on the Horn of Africa region.

The recent war in Tigray has received global concern. Accordingly, two opposing views emerge in relation to the causes and consequences of the war. Most scholars and popular opinion suggest that the primary cause of the war was TPLF's contradictory ambitions following its ouster from state power in April 2018 i.e. it aimed either to forcefully topple the new federal government thereby regaining the power it had lost or else establish a defacto state of Tigray.

TPLF's defiance to the 2018 Asmara Peace Accord, which restored the ties between Eritrea and Ethiopia, was another cause. On the contrary, a considerable number of Tigrayan politicians and activists counter argue that the major cause of the war was TPLF's 'deliberate' exclusion from peace talks that were being held between the Ethiopian federal government and the Eritrean government. Similarly, two contrasting views are expressed as to why the Ethiopian federal army and Eritrean Defence Forces were involved in the same war. While the federal government defends its involvement as a 'Law Enforcement

Operation' to safeguard Ethiopia's unity and territorial integrity, Tigrayans accuse it of undermining the right of regional states to self-determination. Whereas Eritrea defends its involvement as an act of curbing security threat posed on it by the TPLF oligarchy, the latter counter argues it was an act of vengeance.

Using secondary and primary sources, including press releases, video and audio records, interviews as well as the author's own participant observation on unfolding events in Ethiopia and Eritrea, this article discusses prospects of peace in Eritrea and Ethiopia, focusing on the factors that triggered the Tigray War and its ramifications on the peace and security of the Horn region in general, and on the peoples of the two countries, in particular. To examine the current political dynamics of the two countries, the article employs three levels of analysis: individual, state and systemic levels.

Keywords: cause, Peace, security, ramification and war

## **Proliferation of Initiatives and Forums in Horn of Africa Conflicts (Case studies: Sudan/Somalia etc.)**

\* Ali Faqi (MP - Ohio, USA)

**Selam  
Conference  
Center  
Day 1  
5:00 – 5:30**

## **Prospects and Challenges of the Regional Economic Integration in the Horn of Africa: The Case of Eritrea**

\* Yonas Ghebrehiwet  
(Eritrean Center For Organizational Excellence)

\* Samsom Berhane (Ministry of National Development and Finance)

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**Saloon  
Mendefera  
Day 2  
5:10 – 5:30**



Mr. Yonas earned his MSc in Public Policy and Management from the University of London (School of Oriental and African Studies) in December 2011. He completed his BA degree in Public Administration from the University of Asmara in August 2002. His minor field of study is Political Science, International Relations. He worked for the Eritrean Center for Organizational Excellence (ERCOE) from 2013 to 2024. He served in the Center in various capacities such as head of research and consultancy services, a coordinator of various projects, management and leadership trainer, consultant and researcher. He also served as a research expert and recruitment officer in the Civil Service Administration of Eritrea from 2008 to 2013. He has also been engaged as a textbook writer, related to citizenship education for junior and secondary school students in Eritrea.

Regional integration is one of the most effective strategies that enable different states to promote their common interests and strengthen their collective leverage by pooling their respective resources. Hence, all African states and various regions in the continent, like all other states and regions in the world, aspire to establish Regional Economic Integration organs (RECs).

However, there are tremendous challenges experienced in the course of operationalizing such aspirations. For this reason, when examined in terms of geopolitically motivated interferences taking place in the Horn of Africa and the subsequent lack of internal peace

and political stability in the countries of the region, various regional integration initiatives and strategies have been challenged meet their objectives and the desire of the peoples of the region. It is hardly possible to have effective interdependence (integration and cooperation) where there are lack of self-reliant actors, presence of determined foreign interventions and persistent trivial conflicts.

Given such a situation, Eritrea has been exerting tremendous efforts to be an independent and self-reliant actor in the region in particular and in the international community at large. The country also endeavors to promote regional peace, stability, complementarity and free of geopolitical dominant actors influenced regional economic integration initiatives. This paper, therefore, aims to examine the prospects and challenges of strengthening regional economic integration in the Horn of Africa considering Eritrea and its regional influence as a case.

Keywords: challenges, economic integration, Eritrea, prospects, regional integration,

## Regional Security Challenges in the Horn of Africa and the Role of Eritrea

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**Saloon  
Mendefera**  
**Day 2**  
**4:30 – 4:50**



Since the end of the colonial period, the Horn of Africa has faced a series of multiple and complex security challenges (Redie 2021 & De Waal 2015). In addition to the existing different inter-state and intra-state conflicts and natural disasters, a new round of crises by the instability in Ethiopia, Sudan and the Red Sea is looming all around the region. In Ethiopia, a challenging internal conflict and an alarming humanitarian catastrophe have become the characteristic feature of the Ethiopian state. In Somalia, a series of political crises and stalked by the specter of politically-motivated violence, against a backdrop of the increasing influence and capability of the al-Shabab terrorist has remained the major challenge to the revival of the So-

mali state. In Sudan, a popular political reform descended to civil war that tore Sudan into politically inhabitable state. These crises have been aggravated by multiple forms of foreign interventions. Additionally, the Red Sea is increasingly becoming a conflict zone of competing global powers. Haven standing as stable and strong state, Eritrea has remained firm to make contributions in changing the conditions of the region. However, its role in the conflicts has been understood differently. While major Western actors view it suspiciously and discouraged it by denigrating its role, others admire and encourage Eritrea's contribution. The purpose of this paper is to interrogate the role of Eritrea in escalating and deescalating the regional security threats using archival and oral source of data. Its central questions are: to what extent is the role of Eritrea an advantage and a threat to the regional peace and security? Why is its role perceived negatively? Guided by these major questions that will be disaggregated to sub questions, the paper will unpack the complex interpretations on the role of Eritrea in the region.

Keywords: Djibouti, Ethiopia, Red Sea, security, Somalia, Sudan.

## Sources of Failure and Challenges of Governance in Multi-Ethnic Societies: Peace, Security and Development in the Horn of Africa

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**Selam  
Conference  
Centre  
Day 1  
2:30 – 3:00**



Governance in poly-ethnic, poly-lingual and poly-religious societies is characterised by constant tribulations and multiple challenges. One of these challenges concern failure of management of diversity of identity. The second concern is the incompleteness of the process of nation state formation. Mismanagement of diversity of identity and the incompleteness of the process of nation state formation thus underpin the rampant conflicts and wars in the region.

Nation states in the Horn of Africa are colonial constructs. The outcome of the colonial construction is diversity of identity necessitating careful

and diligent construction of nation state. History demonstrates nation state formation is a protracted process, particularly when societal setting is multi-ethnic. Therefore, the process of nation state formation in the Horn of Africa is at an early stage. Even Ethiopia who claim several millenniums of continuous existence and statehood suffers from nation state formation crisis. As a consequence of all this, the Horn of Africa is the most conflict prone region in the African continent. Undoubtedly, there are multiple factors that underpin the region's conflict malleability. Some of the factors of the malleability include nature of state, intra- and inter-state wars, identity-based cleavages and contestations, poverty and underdevelopment, climate driven distresses, democratic deficiency, geopolitics and external interventions. However, these pathologies are credible manifestations of a much more profound problem, notably the incomplete process of state and nation formation.

Recent empirical evidences of the incompleteness of the process are the perennial state resuscitation endeavour in Somalia, the recent war in northern Ethiopia, the war in Sudan and the crisis in South Sudan. We can identify three models of experimentation in nation state formation in the region. These are colonial, proto and national liberation. The paper examines the correlation between the drivers of conflict and the incomplete pro-

cess of state and nation formation. It argues the incompleteness of state and nation formation undergirds the foundation and could explain the problem of governance, lack of peace, security and development in the Horn region. Therefore, successful nation state formation is a condition for alleviation of the challenges and pathologies.

Keywords: conflict, diversity of identity, Horn of Africa, multi-ethnic societies, nation state formation

## **Structural Flaws of the Prevailing Rules-Based International Order**

\* Francesco Perticone  
(Global Regional Studies, Lumsa University, Italy)

**Selam  
Conference  
Centre  
Day 1  
11:30 – 11:50**

# The Dynamic Relationship Between European Union and Eritrea Since 1995

\* Biyan Gebreyesus  
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**Saloon Nakfa**  
**Day 1**  
**5:20 – 5:40**



This article probes the multifaceted relationship between Eritrea and the European Union (EU) since 1995. It delves into the dynamics of this relationship, tracing its evolution from the formative years of Eritrea's independence to the present. The entire set of analysis includes political, social and economic dimensions, shedding light on the complexity and challenges that have been shaping and re-shaping the relations over the last three decades. The aim is to provide a comprehensive account of the two parties' relations, based on interviews, media sources and archival materials collected from local and national resources in Eritrea between January and June 2023. The article argues that the relationship between the

EU and Eritrea since 1995 has been characterized by a complex interplay of cooperation, tension, and ongoing diplomatic dialogue, influenced by a myriad of political, economic, and social factors. The relationship was marked by development cooperation aimed at supporting Eritrea's economic and social development programmes following its independence in 1993. However, the relationship took a U-turn in the early 2000s as concerns emerged over human rights violations and the lack of democratic reforms within Eritrea. These concerns led to a significant tension in 2009 when the EU imposed what Eritrea called unlawful and unjust sanctions on Eritrea, for its alleged support of armed groups in the region and its failure to implement necessary reforms.

Key concepts: Eritrea, European Union, diplomatic relations, foreign policy, cooperation, tension.

# Understanding Sustainable Development Challenges and Prospects in Africa

\* Ali Ibrahim Mohammed-Ali (Adikeih College of Business and Social Sciences)

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**Saloon  
Massawa  
Day 3  
8:50 – 9:10**



Mr. Ali Ibrahim attended his schooling, from elementary all the way to high school in Northern Red Sea Region. He holds BA in Sociology and Social Work from College of Arts and Social Sciences (CASS). He also has MSc. in Sociology, from the University of Buea, in Cameroon. Currently he is working as, Sociology Lecturer at the College of Business and Social Sciences in Adikeih, Eritrea. His area of interest in research includes: sociology of education, social policy, development studies, and research ethics, among others.

After more than four decades of reign of neoliberal policies, Africa's development remained baffling and dismal. With all its rich resources, paradoxically, Africa has continued to descend

into the abyss of economic decadence, security crisis and poverty. This paper attempts to unveil the root causes behind the African economic crisis and development impasse. For better understanding of the historical context, repercussions of Bretton Woods institutions (International Monetary Fund, World Bank, World Trade Organization) and their 'neoliberal economic weapons of recolonization' (structural adjustment policies) are critically examined. Moreover, linking with neoliberalism and its end, the paper also documents the impacts of globalization and the pitfalls of 'modernization without development' on African society and their cultures. More importantly, the external challenges for sustainable development is substantiated by a case of neocolonialism in Cameroon. Also, lack of good leadership is identified as the main internal challenges of the Continent.

The paper concludes that both the internally or externally driven crises in the African states are two sides of the same coin: external capitalist-imperialist states and their compradors (the Bretton Woods institutions) on one hand, and remote-controlled puppet governments within the continent on the other are behind the prolonging crises. The paper firmly reiterated that the prospective solution for all of these, are again in the hands of the peoples of Africa, under the principle of

'African solutions for African problems'. Therefore, it calls for a second African liberation struggle and defiance against the neocolonialists and

their neoliberal politico-economic machines, through 'United African Fronts' in economy, security, education and media coordination. Finally, but more important, the paper proposes essential framework for prospective sustainable development of Africa such as people-centered and equity-based development policies, self-reliant development, institutional integration and synergy, and above all, strong African leadership and good governance.

Keywords: Africa, sustainable development, neoliberalism, structural adjustment policies, neocolonialism, globalization

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## Science and Technology: Earth Science

### Application of Science and Technology in Development

\* Ghebrebrhan Ogubazghi (Keynote Speaker)

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**Selam  
Conference  
Centre  
Day 1  
09:30 – 10:00**



Professor Ghebrebrhan Ogubazghi received the BSc degree in electrical/electronic engineering, MSc in signal processing, and PhD in geophysics, respectively, from the universities of Addis Ababa, Nice (France), and Toulon (France). He was at the Geophysical Observatory of the Addis Ababa University; the University of Asmara; and the Eritrea Institute of Technology; and was engaged in teaching, research, consultancy, and held academic leadership positions at the three universities. His research spans within atmospheric radars, seismology and seismic hazard assessment, and exploration geophysics mainly focussing in the electrical resistivity method. Among his research contributions in radar is the technique

of full decoding of truncated ranges which enhances the performance of these systems, particularly in equatorial regions. His activities in seismology and seismic hazard assessment, include a research stay at the university of Bergen (2001-2002), attendance in a number of workshops and conferences, and engagement in collaborative research with colleagues of the Eastern and Southern Africa Regional Seismological Working Group and with a number of overseas universities, resulting in important publications highly relevant for Eritrea and its surroundings.

We are living in an age of information and communications technology (ICT). Knowledge-based goods and services with capabilities of performing tasks easier, cheaper, faster, and better, are increasingly being available in the world market. Intelligent and smart systems are being introduced in greater numbers, and are improving the lives of those who can afford them. The countries which have greater mastery of science and technology are the main beneficiaries.

The main challenge facing developing countries is climbing the steep road that leads to economic, cultural, scientific and technological developments. The main vehicles for this challenging road are heavy investment in education at all levels, and strong efforts in the creation, mastery and utilization of modern science and technology. However, studies indicate that education is a necessary but not sufficient condition for economic development. It is vital that the social,

political, and economic structures and the technological level of the society to which the educational system belongs are such that graduates can actually make use of their acquired knowledge.

A scheme with a potential of enhancing productivity of subsistence farmers and pastoralists by providing improved seasonal rainfall forecasting is considered, which is best done through regional cooperation.

Another contributor to economic development is the minimization of natural and human induced disaster risks, as stable and sustainable development does not tolerate risks which may have the potential of destroying some or even most of the gains obtained through development efforts, as these undermine stability and sustainability of development.

The paper presents modern handling approaches of natural hazards and the minimization of the associated disaster risks and their management. This is followed by the application of the general principles on two of the main natural hazards in Eritrea, namely, seismic and volcanic, which prevail mostly in the northern and eastern parts of the country. As the country embarks on development, the vulnerability to the prevailing hazards is expected to increase by folds, as the present low population density and very low economic activities in the affected areas are projected to increase in the future by hosting enhanced port, mining, and other economic development activities,

with associated expanded urbanization, road and railway networks, ports and airports with enhanced facilities, power generation and transmission facilities as well as communication networks. This requires correspondingly enhanced capacities, efforts, and higher degrees of priorities for mitigation works. Specific examples based on experiences in Eritrea and other countries are given.

Key words: seismic hazard, volcanic hazard, disaster risks, risk mitigation measures.

## **Assessment of the July-October 2023 Earthquake Swarm in Bada and Foro**

\* Ghebsha Fitwi, Woldeghebriel Genzebu, Kefela Beyene, & Ghebrbrhan Ogubazghi (Department of Earth Sciences, Mainefhi College of Science, Mai Nefhi, Eritrea)

\* Yemane Woldemichael (Department of Mines, Ministry of Energy and Mines, Asmara, Eritrea)

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**Saloon  
Dekemhare  
Day 2  
3:10 – 3:30**



Dr. Ghebsha Fitwi holds BSc in Geology from University of Asmara and MSc in Mining Engineering from Wuhan University of Technology, China. He obtained PhD in 2019 in Geochemistry, from China University of Geosciences, Wuhan, China. His work experience includes, Quality Control & Laboratory Technician (RODABB General Construction Sh. Co, Afabet), Graduate Assistant in College of Marine Science and Technology), Massawa and in Eritrea Institute of Technology, Mai-Nefhi. Since 2019, he is working as Assistant Professor in the Department of Earth Sciences, Mai-Nefhi College of Science. Dr. Ghebsha has also published several scholarly articles.

During July through October 2023, a swarm of earthquakes hit the localities of Gelaalo and Foro administrative sub-zones of the northern Red Sea zone administration of Eritrea. The bigger events of the swarm were located by the Preliminary Determination of Epicenters (PDE) of the United States Geological Survey (USGS), and the located individual events were felt in many parts of Eritrea, in and outside of the two administrative sub-zones, which include, Bada, Foro, Massawa, Asmara, Mendefera, and Adi Keih. The magnitudes of the located events ranged from 4.2 to 5.6 (magnitudes are given in the Richter magnitude scale).

These seismic activities are driven by the geological and geophysical processes taking place in the region where the Arabian, Nubian (African), and Somali tectonic plates are diverging from each

other, across the Red Sea, the northern tip of the East African, and the Gulf of Aden, rift systems, respectively. The three rift systems meet in central Afar.

To inspect the traces left by the earthquakes and to gather more macro-seismic information, a scientific team visited the area and observed, among other things, a major fissure in the neighborhood of Bada (see Fig. 1), having an opening that ranges between 0.3m to 4.8m wide and a strike of 30° NW. No vertical offset was observed. The opening is located at the eastern margin of the Bada Graben.



Fig. 1. Cracks caused by the 5.6 magnitude event in the sediment path (left) and rocky path (right) of the fissure. The paper details the field observations and attempts to connect this to the tectonics of the region.

The paper details the field observations and attempts to connect this to the tectonics of the region.

## **CONNECT: From Past Coral Reefs to Future Research Strategies: Understanding Connectivity and Sea-level Change in Active Rift Settings**

\* Foubert, A., Endeshaw, A., Rime, V. (Department of Geosciences, University of Fribourg, Fribourg, Switzerland)

\* Fitwi, G. (Eritrea Institute of Technology, Mai Nefhi, Asmara, Eritrea)

\* Negga, H. (Department of Geosciences, University of Fribourg, Fribourg, Switzerland; School of Earth Sciences, Addis Ababa University, Addis Ababa, Ethiopia)

\* Tseggai, K. (Commission of Culture and Sports, Asmara, Eritrea)

\* Atnafu, B. (School of Earth Sciences, Addis Ababa University, Addis Ababa, Ethiopia)

\* Keir, D. (Department of Earth Sciences, University of Florence, Firenze, Italy; School of Ocean and Earth Science, University of Southampton, Southampton, UK Environmental Science and Geology, Wayne State University, Detroit, US)

\* Kidane, T.

\* Ogubazghi, G. (Eritrea Institute of Technology, Mai Nefhi, Asmara, Eritrea)

**Saloon  
Dekemhare  
Day 2  
2:30 – 2:50**

Prof. Anneleen Foubert is currently Full Professor in Sedimentology at the University of Fribourg, Switzerland. She is chairing the 'Sedimentology and Paleo-environments' research group studying geobiosphere interactions in sediments and using those sediments as true paleo-environmental archives or natural environmental resources. During the last decade, the research group chaired by Prof. Dr. Anneleen Foubert studied and mapped the sedimentary and paleoenvironmental archive in the northern Afar. After her PhD-studies at the Renard Centre of Marine Geology at the University of Ghent (Belgium), Prof. Dr. Anneleen Foubert has been working in the industry (Total Energies, France) and moved then back to Academia as scientist at the University of Leuven (Belgium) and the GEOMAR Helmholtz Centre for Ocean Research (Germany). Since 2013, she is appointed as Professor at the University of Fribourg, Switzerland.

Recent and elevated Pleistocene coral reef terraces are a ubiquitous and striking geomorphological feature flanking the Red Sea shorelines. While most studies focused on the northern Red Sea regions, data are often missing for the southern Red Sea. Recent studies have shown the occurrence of Pleistocene coralgal reef terraces in the Danakil Depression, one of the most tectonically and volcanically active regions on Earth at the transition between continental rifting and oceanization. Those Pleistocene coralgal reef terraces witness the connection of the Southern

Red Sea with the Danakil Depression during past interglacials. However, the gateways connecting the southern Red Sea with the Danakil Depression during Pleistocene times are unknown and an integrative Pleistocene stratigraphic and comparative paleo-environmental framework for those regions are missing. Especially, along the western margin of the southern Red Sea (Eritrea), consistent data are lacking. Considering those current knowledge gaps, the CONNECT project aims to understand the spatial and temporal distribution of Pleistocene marine coralgal reef terraces along the Eritrean southern Red Sea margins and the gateways connecting the Southern Red Sea with the Danakil Depression tuned by both eustatism and volcano-tectonic processes, as well as to unravel their unique record of paleoenvironmental change.

Taking this holistic and multidisciplinary research focus will result in the better understanding of (1) sedimentation patterns in transitional rift basins and associated opening and closing mechanisms related to the onset of oceanization, and (2) processes that govern coral growth and demise in extreme rift settings at the threshold of environmental gradients. Studies on Pleistocene coralgal reefs in marginal settings will certainly help in constraining the effect of environmental stress related to climate change on Modern Red Sea corals. Large-scale mapping combined with detailed paleo-environmental studies, taking an integrative and inclusive approach at all levels, will nurture

long-standing cooperation in teaching and research but also provide input for future strategies related to climate change and natural hazards (e.g. flooding/desiccation of key areas related to the combination of eustatic sea-level change and volcano-tectonic processes).

## **Earthquake Monitoring Practices in the Afar Depression and Challenges of Disaster Risk Management**

\* Atalay Ayele  
(Prof.), (Institute of Geophysics, Space Science and Astronomy, Addis Ababa University, Addis Ababa)

\* Ghebsha Fitwi and Ghebrehan Ogubazghi (Department of Earth Sciences, Eritrea Institute of Technology, Asmara, Eritrea)

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**Saloon  
Dekemhare  
Day 2  
2:50 – 3:10**

The East African Rift system (EARS) is one of the striking features of the African continent that captures all stages of rift development from the most juvenile in the Okavango delta to nascent seafloor spreading in the Afar depression. It provides a natural laboratory for

studying a fundamental, and yet enigmatic, component of plate tectonics. A mechanism for rupturing thick, cold, continental lithosphere is not readily apparent in conventional models of mechanical stretching. However, magma production weakens the plate and serve to localize strain, thus better facilitating rifting.

Studies of seismicity and volcanism provide insights into this problem and a variety of geophysical, geochemical and geological studies can be used to better understand the role of the crust and mantle in continental breakup. Permanent seismic station distribution is sparse in the continent and as a result seismicity in the lower magnitude range is in general under reported which is evident from some focused and detailed studies that have been conducted using temporary broadband seismic networks in collaboration with overseas researchers. It is inferred from these episodic observations that the EARS is more active than we think. Earthquake vulnerability in the continent is generally considered low but events of about magnitude 7.0 are observed in the EARS from instrumentally recorded seismicity (the 1910 Rukwa earthquake in Tanzania, the 1990 earthquake in South Sudan and the 2006 Machase earthquake in Mozambique) which is a wakeup call for the fast-growing construction industry in the region.

To bridge gaps in capacity and to strengthen observational seismology in EARS, the Eastern and Southern Africa Regional Seismological Working

Group (ESARSWG) was established in 1993. This group comprises 9 countries: Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe. The group is supported by the International Science Program (ISP) of Uppsala University to date, which need to be taken over by the African governments, but observatories and geological surveys are struggling to keep the monitoring culture under difficult conditions which requires collaborative efforts to enhance studies in the region both for basic science research and disaster risk management purposes.

## **Mineral Deposit and Tectonostratigraphic Domains in Eritrea: North East Africa**

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**Saloon  
Nakfa  
Day 3  
2:00 – 2:30**



Mr. Woldegabriel has been working in Geological Mapping and Exploration for various institutions. At present, he is a senior lecturer, in Mai Nefhi College of Science at the Dpt. of Earth Sciences. He published several articles. He got his B.Sc. from Addis Ababa University, Ethiopia. He holds two Masters from University of Roorkee, India and Indian Institute of Technology respectively

The Precambrian basement rocks of Eritrea, consisting of a number of different types of Tectonostratigraphic Units (Domains), occupy a wide area about 60% of the country. The domains were formed as a result of accretion of dominantly oceanic arc and back arc-related volcano- sedimentary assemblages. Limited exploration activities conducted in the last few years reveal the great precious and base metal mineral potential of the country. More than four base metal and gold mines are currently being mined. A number of prospects are under detail exploration.

Due to scarcity of published geological information related to the occurrence and distribution of Tectonostratigraphic domains, it has been difficult to consider and make use of the existence of different domains that make up the basement rocks of Eritrea. However, most of the discovered deposits are hosted by a succession of volcanic flows and associated pyroclastic rocks belonging to different Tectonostratigraphic domains. There are a number of prospects hosted by rocks belonging to different domains. The different Tectonostratigraphic domains are believed to represent different lithologic assemblages related to different tectonic set-

tings that could be at different stages of evolution.

The Neoproterozoic basement rocks of Eritrea have been divided into six distinct Tectonostratigraphic Terranes, each differing markedly in structural style and stratigraphic content and all are bounded by shear zones. In a later work, however, the Nakfa Terrane has been subdivided into a number of domains based on distinct lithological assemblages, sharp boundaries marked by either shear zones, thin belt of mafic-ultramafic lenses or granitoid bodies.

Field investigation, review and compilation of the geologic set up of host rocks to the different mines, show the close relationship to the tectonostratigraphic terranes and domains. It is, therefore, suggested here that those engaged in exploration activities should consider the Tectonostratigraphic divisions of the basement rocks and their boundaries or contacts to other domains during their field investigations and interpretation of assay data.

## Remote Sensing and GIS Application in Selecting Optimal Locations for Solar Plants- A Case Study-Eritrea

\*Temesghen Eyassu

Sereke: (Moscow State University of Geodesy and Cartography, College of Business and Social Science, Adi Keih)

**Saloon  
Akurdet**

**Day 1**

**5:40 – 6:00**

The rapidly growing global demand for fossil fuels has pushed the millennia long climate stability to the brink of collapse. Hence it was deemed necessary for the world to look for alternatives to the unsustainable reliance on fossil fuels. Nevertheless, despite the numerous progresses made across the globe in moving towards renewable energy, the limited financial and technical skills in developing regions still made the world to significantly remained dependent on fossil fuels. Eritrea, with its 95% of energy is still generated from fossil fuels, is in need of sustainable and affordable energy source to fuel its economy. However, irrespective of the country's huge potential in solar energy with a yearlong sunshine in most parts of the country, solar energy in the country remains as one of the most underutilized resourc-

es. Moreover, the problem is further compounded by the dearth of scientific research on related areas among other factors. Hence, the current study is set to produce a solar power suitability map for the country using a Multi-Criteria Decision-Making Method (MCDM) and GSI approaches with an employment of climatic, geomorphological and environmental data sets demonstrated in nine criteria, i.e., Global Horizontal Irradiance (GHI), Air Temperature, Aspect, Slope, Wind Speed, Air Pressure, Land Surface Temperature (LST), Air Humidity and Land use land cover (LULC). ArcGIS 10.8.2 and QGIS 3.43.3 were utilized in analyzing, processing, computing and creating maps. The criteria were selected based on reviewing previous studies and expert knowledge in the field. Analytic Hierarchy Process (AHP) as the decision-making tools was used to determine the corresponding weight of each criterion and accordingly five classes for each criterion with the values ranging from 1 to 5 were assigned. A suitability map was later produced using a weighted overlay approach. The consistency ratio of the study was 0.089712319 which fell within accepted range. Finally, the study found out that 1.4 % of the country is highly suitable, 43.08% moderate suitable, 51.2% suitable, 4.2% least suitable and less than 1% unsuitable. Hence, more than 95.7 % of the study area is suitable to harvest solar energy. This research will contribute to the pool of literature on the country's potential on renewable energy and is expected to

serve as a reference material by decision makers in their effort towards a sound energy policy.

Keywords: Global Horizontal Irradiance (GHI), Land Surface Temperature (LST), Multi-criteria Decision Making (MCDM,) Analytic Hierarchy Analysis (AHP), Remote Sensing and GIS.

## Optimal Design and Life of Mine Scheduling of Okreb Open Pit Mine

- \* Abraham Mehari (BSC in Mining Engineering)
- \* Estifanos Eyob (Undergraduate Mining Engineering)

**Saloon Nakfa**  
**Day 3**  
**2:30 – 3:00**



Twenty years ago, Eritrea was young nation with limited mineral exploration but as soon as the discover and exploitation of Bisha mines, an intensive exploration effort has led to discover of numerous precious metals and industrial minerals that can be extracted at a profit. Okreb being one of recent discoveries with deposit of calcium carbonate or commonly known as lime has a potential to play a big role in the Nation's Economy. The aim of this study

is to design an optimized open pit for extraction of  $\text{CaCO}_3$ . Data Obtained from exploration department was used to create a block model on Surpac, a well-known software used for designing open and underground mines. The model was exported to Whittle, a software used for creating optimised shell used for better design of pit. In Whittle a total of 29 p-shells were created but one with high NPV was selected, shell 5 with possible NPV of \$437,261,419. where this shell was imported back to Surpac for detail design of the Pit, Dump and Process plant. After completing designs in Surpac a MineShed was used to create schedule for the design, giving a result of 7 years of mining and 4 years more of processing with total ore mined of 19,934,370 tones (or In Volume 7,328,813 Cubic Meter) and mined waste of 13,250,855 tonnes (or In Volume 4,840,625 Cubic meter). Reading from International market the price for lime is \$220/tonne. The project will require an initial investment of \$60,274,717 in the first year and total CapEx (Investment) of \$117,824,914. Taking under discount rate of 8% and under the recommended design This project will produce NPV of \$ 3,334,860,419 us dollars without tax

Keywords: industrial minerals, lime, mineral exploration, Okreb, open pit, precious metals.

## Science and Technology: Energy Wind Engineering for Climate Resilient and Sustainable Infra- structure: Insights and Oppor- tunities for Eritrea

\* Girma Bitsuamlak (Key-  
note Speaker)

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**Saloon  
Nakfa  
Day 3  
2:30 – 3:00**



Prof. Girma Bitsuamlak is a building engineer dedicated to enhancing the climate resiliency and sustainability of buildings and neighborhoods. He is a professor at the University of Western Ontario (UWO) and the director of the WindEEE Research Facilities, one of the 19 Canadian Foundation for Innovation – Major Scientific Initiative (CFI-MSI) facilities of national importance. Additionally, he is the site leader for SHARCNET Advanced Research Computing. Prof. Bitsuamlak has contributed to wind resiliency through the development of innovative large-scale wind testing methods for hurricanes, tornadoes, and downbursts. He co-created

large-scale experimental testing facilities, such as the Wall of Wind in Miami and the tornado and downburst testing techniques at the WinDEE Dome at UWO. He has also developed computational workflows for evaluating wind loads from large systems like hurricanes and localized events like tornadoes, and for modeling the interaction between aerodynamics and thermodynamics essential for designing sustainable buildings. He has published over 220 peer-reviewed papers and supervised 78 postgraduates, including 31 MEng/MSc students, 35 PhD students, and 12 postdoctoral fellows, many of whom are now working in academia or industry. Prof. Bitsuamlak's practical experience includes engineering wind projects for significant structures such as the Burj Khalifa, Freedom Tower, and over 100 other tall buildings and long-span roofs worldwide. He is frequently consulted to review complex wind projects, including micro-climate studies, solar farms, tall buildings, and wind loss models. Prof. Bitsuamlak is a key contributor to the development of wind research roadmaps organized by NIST and ASCE-SEI, as well as the NSF USA 2025-2035 decadal natural hazard roadmaps. He is a fellow of the Canadian Society for Civil Engineering (CSCE) and a member of the ASCE 7 Wind Load Committee. Additionally, he serves as an associate editor for ASCE Structural Engineering, Natural Hazard, and CSCE civil engineering journals.

Wind engineering challenges arise from the interaction of turbulent low-

er atmospheric flows with bluff bodies. Boundary layer wind tunnels, which effectively generate targeted turbulent flows, have been extensively used in industry. However, the increasing complexity of multi-physics and multi-scale phenomena required for resilient wind design, wind resource assessment, and broader sustainability goals highlights the need for an integrated approach, which will be the focus of this talk. This approach combines wind tunnel experiments, field measurements, and advanced computational fluid dynamics (CFD), structural analysis, and building physics methods within a digital twin framework. Ongoing efforts address multi-climate stressors, such as the impact of extreme winds on buildings and energy infrastructure (e.g., solar panels, wind turbines, and transmission lines), wind flow characterization over complex topographies for wind resource assessment and wind speed-up determination, and the influence of aerodynamics on the thermal and energy performance of buildings for sustainable design. While individual wind engineering tools generate valuable insights, their seamless integration with building information modeling (BIM) -- spanning data, simulation, modeling, and visualization -- is transforming how climate resiliency and sustainability challenges are addressed. By closely replicating real-world wind engineering problems, this integration enables engineers and architects to develop more realistic and efficient sustainable design solutions. High-end research and con-

sulting project examples will be presented during the talk. As Eritrea embarks on rebuilding its civil and energy infrastructure, climate resiliency and sustainability must take center stage, and this talk will also explore opportunities for collaboration, experience sharing, knowledge transfer, and training programs to support these efforts.

Keywords: Wind loading, wind energy, building, solar panel, transmission lines, wind turbine, WindEEE, wind tunnel, CFD, BIM, digital twin, AI, sustainability

## **Solar-Powered Raspberry Pi School Lab: Bridging Educational Gaps in Eritrea through Sustainable Technology Integration**

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**Saloon  
Akurdet**

**Day 3**

**10:50 – 11:10**

This abstract delineates the conceptualization and implementation of a groundbreaking project aimed at transforming education in Eritrea – the Solar-Powered Raspberry Pi School Lab. Recognizing the challenges posed by unreliable electricity access, especially in rural areas, this initiative combines

the versatility of Raspberry Pi with sustainable solar power to create an innovative, eco-friendly solution for enhancing education.

The Solar-Powered Raspberry Pi School Lab initiative responds to the critical need for sustainable and accessible education in Eritrea. Recognizing the challenges posed by unreliable electricity infrastructure in many regions, this project aims to leverage solar power to provide a consistent and eco-friendly energy source for Raspberry Pi-based computer labs in schools. By combining cutting-edge technology with renewable energy, the initiative not only addresses immediate educational gaps but also contributes to environmental sustainability. The proposed Raspberry Pi school lab seeks to address these challenges by introducing an affordable and scalable solution that integrates technology into the existing education system. The project involves setting up a computer lab equipped with Raspberry Pi single-board computers, peripherals, and relevant educational software.

### **Methodology**

The project involves the deployment of Raspberry Pi single-board computers within a tailored solar power system. Each computer lab will be equipped with educational peripherals, internet connectivity where feasible, and solar panels to ensure energy self-sufficiency. Collaborating with local communities, the installation process will be a participatory effort, with a focus on training local technicians and involving com-

munity members in the maintenance and upkeep of the solar-powered labs.

## **The Relationship Between Eritrea's Education Policy and In-service Teachers' ICT Use, Attitude, and Future of ICT in Education**

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**Saloon  
Akurdet  
Day 3**

**10:30 – 10:50**

In many countries, teachers are required to use ICT in their lessons to support students' relevant and interesting learning experiences while adhering to educational policies. To find out if teachers' actual technological uses in the classroom are linked with national ICT in Education Policies and curriculum expectations relevant research is necessary. The professional development program adopted and contextualized teachers' ICT use and perception to investigate teachers' ICT integration practices concerning Eritrea's Education policies and the future of ICT education. This mixed-method study conducted semi-structured interviews with five and a survey (n=141) of In-service

teachers from Asmara College of Education. According to this study, teachers primarily perceive technology as a productivity device to support traditional teacher-centered teaching duties however, the goals outlined in Eritrea's ICT policies and curricula appear to conflict with the technology's limited use in constructivist teaching methods and student-centered learning. The findings demonstrate a discrepancy between what teachers do in the classroom and what ICT policies mandate. Educational policy impact is significant on teachers' perception of ICT use and discussions emphasize how important it is to change teachers' attitudes, levels of expertise, and teaching strategies to bridge the knowledge gap and successfully execute ICT use policy initiatives in the classroom.

Keywords: Education policy, Eritrea, ICT use, In-service teachers, Teacher's perception

# **Introducing Sodium-ion Batteries into the African Market: Eritrea as A Gateway of the New Arcade**

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**Saloon  
Akurdet  
Day 1  
5:20 – 5:40**



Energy is a crucial concern for governments, industries, scientists, businesses and policymakers. The exceeding consumption of non-renewable fuels by automobiles and manufacturing industry has caused in hazardously great levels of CO<sub>2</sub> in the atmosphere at the last 70 years. The impact on the environment, climate and public health urge governments to find new technologies to ensure a sustainable development. The industry of lithium-ion batteries has been doubling in its consumption since 1991; its introduction by Sony factory which modernized mobile devices and heavy machineries, but it didn't contribute whatsoever towards the sustainability of the renewable energy. Unfortunately, an increase in our lithium consumption

coupled with its low abundance in the globe's crust raised financial and sustainability concerns, forcing many of us to think about complementary battery technologies. Sodium-ion battery came along and its research is relatively young compared to other battery types but has great potential due to the abundance and low price of sodium heralds which are used for the production of the battery components.

Sea salt or Sodium (Na) has a potential ability as a raw material for sodium batteries, and the usage of sea salt in this process reduces production costs, because the salt is very abundant and environmentally friendly as well. The Sodium-ion technology is considered as one of the candidates for Lithium-ion succession in the following 5-10 years because of different and many reasons. Moreover, adequate storage technologies are needed to allow a transition to renewable energy sources from fossil fuels. That's why in support of this transition, this paper analyzes the technological capabilities, advantages of sodium-ion over lithium-ion and the marketing strategies needed to start this new mark in Africa by choosing Eritrea to be the heart of this grand notion; But why? Eritrea is a country located on the horn of Africa owning the longest sea shore of the Red Sea, which by far makes it the only strategic place to distribute for the whole African nations. In 1930's the Italians built rail roads, circuit cables, roads that went to all parts of Eritrea and if they had stayed a bit longer

it would have been connected to the entire continent. The preliminary plug for these accessories was the Massawa port; the most abundant and non-ending Sodium-ion (NaCl) owner. All in all, this paper tries its hard to explain this new market and its sustainability on the environmental issues and also why Eritrea was chosen for this special task.

Keywords: Sodium-ion batteries (SIB), Lithium-ion batteries (LIB), marketing strategies, technological capacities, strategic position, sustainability and environmental issues.

## Renewable Synergy: A Holistic Approach to Power System Design in Eritrea

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**Saloon**  
**Akurdet**  
**Day 1**  
**5:00 – 5:20**



Mr Teklebrhan is a PhD candidate specializing in energy modeling, focusing on developing innovative computational models to support the integration of renewable energy on a large scale, advancing efforts toward a sustainable energy transition. He holds a BSc in Mechanical Engineering from Eritrea Institute of Technology (EIT), Eritrea, and an MSc in Energy Engineering from Halmstad University, Sweden. Currently, he is pursuing his PhD in Mechanical Engineering (Energy modeling) at the Hungarian University of Agriculture and Life Sciences, Hungary.

The imperative deployment of renewable energy (RE) resources is pivotal for attaining a low-carbon economy and ensuring sustainable development. This study thoroughly examines the intricacies of the current energy transition, emphasizing the need for a substantial

increase in renewable penetration within the power system. On a global scale, the technical potential of RE resources is extensive, a fraction of it can satisfy the world's energy demand. The study, centered on Eritrea, employs an advanced simulation model that takes into consideration several factors, including the mix of PV and wind, curtailment, storage, and balancing requirements. The findings demonstrate that a penetration of 90% renewables is easily achievable by introducing a storage of below 0.5 average daily demand. The synergistic interplay between PV and wind emerges as advantageous, effectively mitigating fluctuations, enhancing penetration, and minimizing curtailment. The model not only provides quantitative insights but also facilitates the creation of novel and improved 3D visualizations, contributing to a more comprehensive understanding of the intricate relationships among these factors. This research underscores the paramount importance of comprehending parameter interactions in designing optimal grid systems with a substantial share of renewables. The insights derived from this study offer valuable quantitative perspectives, benefiting not only Eritrea but also providing a broader global outlook on transitioning to sustainable power systems. By highlighting the benefits of combining PV and wind energy, the study provides practical insights that guide decision-making toward achieving renewable energy objectives. This contributes to a more strategic and informed approach for successful and sustainable energy transitions.

## Science and Technology: Chemistry

### Biotech Advancement and New Techniques in Biochemistry

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**Selam  
Conference  
Centre  
Day 2  
8:30 – 8:50**



## Prospects of Organic Fish Amino Acid and Seaweed Liquid fertilizers as an Alternative Organic Fertilizers in Eritrea

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\* Dermas Sultan (National Agricultural Research Institute, Halhale, Eritrea)

\* Million Tewelde and Biniam Teweldebrhan (Zoba Maekel Branch, Ministry of Agriculture, Asmara – Eritrea)

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**Saloon  
Akurdet  
Day 2  
5:10 – 5:30**



Mr. Temesgen is a lecturer in Mai Nefhi College of Science, Department of Biology. He holds B.Sc., in Applied Marine Science from Massawa College of Marine Science and Technology. He has also M.Sc. in Marine Biotechnology, from Nanjing Agricultural University, PRC. He is a chairman of National Organic Fertilizer and Bio-pesticide Com-

mittee. He is also a member of Eritrean Fisheries Stock Assessment Technical Working Group and other international bodies. He published several articles on reputed journals in the areas of marine science and marine biotechnology.

The soil of Eritrea is generally known to be calcareous Alkaline with very low organic matter and nutrient content. Thus, farmers have been heavily dependent on the supplemental use of artificial chemical fertilizers mainly DAP and Urea. This is not just in Eritrea, but throughout the world. A number of researches have documented how much farmers everywhere have been relying on the chemical fertilizers to boost their production. However, although the use of the chemical fertilizers is known to boost production, its excessive use and misuse has also been known to cause a number of environmental pollution and ground water contamination incidents. Chemicals leaching from farmlands also make their way in to the sea through river runoff causing mass aquatic organism deaths and harmful algal blooming. Furthermore, imbalanced use of chemical fertilizers can also alter soil pH, increase pest attack, create acidification, and soil crust. All these can lead to a decrease in soil organic carbon content and useful organisms ultimately stunting plant growth and yield; or even leading to the emission of greenhouse gases. Consequently, the world is now veering towards organic agricultural inputs. Among the many organic fertilizers are fish amino acid (FAA) and seaweed liquid fertilizers

(SLF). This paper presents a summary of ongoing nationwide trials conducted on different horticultural crops such as on potato, wheat, and lettuce. For instance, results of the experiment have shown that highest potato tuber yield (33.9 t/ha) with 82.3% yield advantage over the control (18.59 t/ha) was obtained from the application of 150ml/lit of SLF and 100ml/lit of FAA. Furthermore, highest yield of wheat (30.64Qt/ha) was obtained from the application of 90ml/lit of FAA and 60ml/lit of SLF while (18.89t/ha) was recorded for the control. Similarly, 1:10 dilution rate of SLF and FAA improved seed germination rate of lettuce seeds by 50% and 40%, respectively. Findings of the research trials at different agro-ecological zones of the country have proven the potential of FAA and SLF as organic liquid fertilizers.

**Keywords:** Organic fertilizers, fish Amino Acid, Seaweeds, Eritrea.

## Quality Assurance of Water Sources in Amadr and Sheka-Wedi Bsrat

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**Saloon  
Akurdet  
Day 2  
4:30 – 4:50**



Dr Aron Hailemichael is currently a teaching staff (Assistant Professor II) at Mai Nefhi College of Science in the Department of Chemistry since 2017. Formerly, he has teaching experience (1997-2006) in Asmara University and 2006-2013 in Eritrea Institute of Technology. Mr. Aron holds a BSc (Asmara University), BSc (Honours), MSc and PhD degree in chemistry (Stellenbosch University, South Africa). His main duties comprised analysis and monitoring of varied samples in the environment (water, soil and air) that include chemical separation, identification and determination of heavy metals, ions, gases in addition to the identification of recognition pheromone of animals.

Water has paramount importance for

both plants and animals. The supply of safe potable water to a society should be one of the priorities of countries. The Government of Eritrea is endeavoring to provide safe drinking water for its people. Nowadays, majority of the people have access to clean water. Yet, an organized effort should be carried out to meet the demands of the people and achieve the standards of WHO. The Eritrean people use water for various activities, inter alia, drinking, cleaning, agriculture, industries and traditional medicines. It is to be noted that Eritrea is a country where traditions and culture are preserved so well and breathing life. It is common to see people using traditional medicines all around the country. For example, the water sources in the vicinity of ShekaWediBsrat and Amadr are commonly used by the society for both domestic use as well as in medication for kidney stone.

The aim of this study is to assure the quality of water sources at ShekaWediBsrat and Amadr and describe the chemistry behind the water used as medication and in comparison, with nearby water sources. All of the sources were boreholes and lifting device varied from solar to hand-pump. The quality of water from these sources was examined by measuring various physicochemical parameters, bacteriological contaminants and heavy metal content of the sources. Various instruments were employed including digital pH meter, conductivity meter, turbidimeter, flame photometer, spectrophotometer, and ICP-AES instrument. The physico-

chemical parameters measured in this study include pH, alkalinity, conductivity, nitrate, K, Na, and 8 heavy metals (As, Pb, Cr, Co, Ni, Fe, Cu and Zn) were also analyzed. The results revealed that water from these sources were potable as the values of the various physical and chemical parameters measured were in agreement with WHO guidelines for drinking water. Except for the water sources, Amadr II and ShekaWediBsrat. The water source Amadr II was found to be contaminated with manganese and the water source ShekaWediBsrat was found to be coliform contaminated. In addition, the water sources ShekaWediBsrat and Amadr I were identified as  $\text{NaHCO}_3$  type water which might be the possible reason behind the use of these waters as recent studies have shown that  $\text{NaHCO}_3$  can mitigate kidney stones. Therefore, this study suggests that the sources should be consistently be protected from animal wastes and other contaminants and routine quality inspection should be carried out.

Keywords: ShekaWediBsrat, Amadr, drinking water sources, physicochemical parameters, bacteriological contaminants, heavy metals

# Real-Time Solar Radiation Prediction Using Deep Neural Networks (AI) for Large-scale Photovoltaic Integration in Areza, Eritrea

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\* Merhawi Ghebregziabihier (Budapest University of Technology and Economics- Faculty of Electrical Engineering and Informatics, Budapest, Hungary; MaiNefhi College of Engineering and Technology, Department of Computer Science and Engineering)

\* Teklebrhan Negash (Doctoral School of Mechanical Engineering, Hungarian University of Agriculture and Life Sciences, Godöllő, Hungary; MaiNefhi College of Engineering and Technology, Department of Mechanical Engineering)

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**Saloon  
Akurdet  
Day 2  
4:50 – 5:10**



Utilizing data from the renowned PVGIS database, this study develops a weather forecasting model tailored for Areza, Eritrea, primarily focusing on predicting solar irradiance (SI) for photovoltaic energy generation. Unlike conventional energy generation technologies, renewable energy resources suffer from intermittency, which can affect grid stability and marginal dispatch strategy. A well-developed prediction algorithm is crucial for forecasting generation profiles ahead, enabling power operators to dispatch generation units efficiently. This study aims to address these challenges by predicting PV generation on a day-ahead time scale, providing sufficient time to arrange generators effectively. By implementing advanced forecasting techniques for SI, this study seeks to overcome the severe impacts of intermittency and improve marginal dispatch and control strategies. Conventional prediction models, such as the Autoregressive Integrated Moving Average (ARIMA) time series model and backpropagation (BP) neural network model, often exhibit significant errors in predicting weather variables. The proposed real-time weather prediction model utilizes a Recurrent Neural Network called Long Short Term Memory (LSTM) that fits the unique weather conditions of Areza. Using multiple features to predict more accurate and reliable solar radiation. The study aims to improve storage utilization and dispatch strategy. Though the study is developed based on the unique weather conditions of Areza, the model, howev-

er, can be applied for other sites which exhibit similar weather conditions. The overall results are expected to offer essential insights into facilitating sustainable and efficient energy practices in Eritrea.

Keywords: deep neural network (DNN); long short-term memory (LSTM); solar radiation; Eritrea Areza; photovoltaic integration

## Science and Technology: Maths

### Discret Maximum Principles for Courant Finite Element Solution of Some Nonlinear Elliptic Problems

\* Menghis Teweldebrhan  
Bahlibi

**Saloon Mas-  
sawa  
Day 1  
3:30 – 3:50**



Discrete maximum principles are essential measures of the qualitative reliability of the given numerical method, therefore they have been in the focus of intense research, including nonlinear elliptic boundary value problems describing stationary states in many nonlinear processes. This paper considers a general class of nonlinear elliptic prob-

lems that covers various special cases and applications. Generally speaking, it provides a priory known bound of the unknown solution, provided some conditions on the given data are imposed. Such maximum principles are now known for many nonlinear elliptic problems appearing in several important applications in physics and engineering. Therefore, their suitable discrete analogs, commonly called discrete maximum principles, or DMPs, have drawn much attention. A DMP is a relevant measure of the qualitative reliability of the given numerical method since otherwise one might get physically incorrect numerical solutions, such as negative concentrations in some parts of the space domain. In all the papers studied before, the DMPs for nonlinear problems with lower-order terms (typically arising from reaction-type processes) have been derived under the condition that the mesh parameter is sufficiently small. However, no exact condition on the required mesh size has been given. The present paper aims to fill this gap from the point of view of concrete applications. We provide exactly computable conditions on the geometric characteristics of widely studied finite element shapes: triangles (Courant element), tetrahedra, prisms, and rectangles, and guarantee the validity of discrete maximum principles under these conditions. Finally, we illustrate numerically that the restrictions on the mesh size are indeed necessary in practice.

## Exploring the Interplay of Mathematics and Medicine

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\* Ghidewon Abay-Asmerom (Department of Mathematics, Virginia Commonwealth University)

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**Saloon  
Massawa  
Day 1  
2:50 – 3:10**



The integration of mathematics into medicine represents a dynamic intersection, yielding profound advancements in both disciplines. This abstract delves into the symbiotic relationship between mathematics and medicine, elucidating how mathematical principles and techniques enhance our understanding, diagnosis, and treatment of various medical phenomena.

Mathematics serves as a fundamental tool for modeling biological systems, from the intricacies of cellular processes to the dynamics of organ systems. Dif-

ferential equations, probability theory, and computational modeling provide frameworks to simulate physiological functions, offering insights into disease mechanisms and therapeutic interventions. Through mathematical modeling, researchers can predict the spread of infectious diseases, optimize drug dosages, and design personalized treatment regimens tailored to individual patient profiles.

Moreover, mathematics plays a pivotal role in medical imaging, facilitating the visualization and analysis of anatomical structures and pathological conditions. Techniques such as computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) rely on mathematical algorithms for image reconstruction, segmentation, and quantitative analysis. These advancements enable clinicians to detect abnormalities, monitor disease progression, and guide surgical interventions with enhanced precision and efficacy.

Furthermore, mathematical approaches contribute to the field of genomics and personalized medicine, elucidating genetic variations associated with disease susceptibility and drug response. Statistical methods, machine learning algorithms, and network analysis techniques enable the interpretation of high-dimensional genomic data, fostering the development of targeted therapies and precision medicine strategies.

In this presentation we will highlight some of these applications using math-

emathical formulations. The focus is on the role of mathematics on medical imaging.

Keywords: Epidemiology, SIR, SEIR, CT-scan, X-ray, Radon Transform.

## **Ge'ez Fidel Structural Analysis using Graph Kernels**

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### **Saloon Nakfa**

#### **Day 2**

**10:30 – 10:50**

Graph based models are playing a prominent role in the digital age thanks to their versatile applications. From complex scheduling problems to map navigation, from data structures to search engine algorithms, and from literature to archeology, the reach of graphs (modeled as vertices and edges) is far and wide.

Within the realm of pattern recognition itself, graphs play a central role. Graph embedding-based pattern recognition methods integrate the computational efficiency of statistical methods

with the structural power of graphs. Implicit graph embedding methods leverage graph kernels to directly evaluate kernel functions within the graph space, while explicit methods embed input graphs into feature vectors unleashing all linear algebraic tools in the ensuing inner product space.

In a nutshell a graph kernel is a function designed to compute an inner product on graphs. Essentially, graph kernels quantify the similarity between pairs of graphs, thereby enabling the comparison of graph structures. This facilitates the utilization of kernelized learning algorithms to operate directly on graphs, obviating the need for feature extraction to convert them into fixed-length, real-valued feature vectors.

There are dozens of graph kernels; to mention a few: random walk kernels, shortest path kernels, subtree kernels, and graphlet kernels. Due to their simplicity and ease of implementation (not necessarily efficiency) they are finding extensive application in bioinformatics, chemoinformatics, and social network analysis.

This study employs graph kernel concepts to investigate the similarities and disparities among the over three hundred G ez characters (Fidelat). By representing each Fidel as a graph and leveraging techniques from graph kernels, unexpected patterns within the G ez writing system are elucidated. In particular, structural analysis shows that the perceived irregularity and lack of uniformity of the 6th order (the sadis

fidelat or vowelless characters) doesn't relegate this family to the periphery of the writing system, in fact they are closer to the center than one would expect, thereby underscoring their significance within the broader context of the Ge'ez writing system.

## The Impact of Mathematics on Development and Advancement

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**Saloon  
Massawa  
Day 1  
3:10 – 3:30**

Mathematics is the fundamental language and toolkit for scientists, engineers, and architects, enabling them in the analysis, design, and optimization of complex systems and structures. Due to this fact the integration of mathemat-

ics into various aspects of society has reached unprecedented levels in this century, fundamentally shaping human endeavours across disciplines. Traditionally, fields like computer science, physics, and engineering have relied on mathematics as the cornerstone, supplemented by experimental validation. However, the influence of mathematics extends far beyond these domains.

As we speak, the collaboration between mathematics and artificial intelligence (AI) is leading to ground-breaking advancements in many fields, including healthcare, finance, and transportation. Mathematical principles form the foundation of AI algorithms, enabling the processing and interpretation of vast datasets. This synergy is fuelling innovation in machine learning, natural language processing, and robotics, driving transformative developments such as personalized medicine, and intelligent assistants.

Mathematics is also key in data security, encryption, and compression, ensuring secure communication and information protection. Error-correcting codes and compression algorithms optimize data transmission and storage while maintaining data fidelity.

Mathematical principles are also guiding the analysis of symmetry properties and spatial arrangements, facilitating drug design. Pharmacology benefits from mathematical modelling and computational approaches, accelerating drug discovery and enabling personalized medicine strategies. Similar-

ly, genetics and epidemiology leverage mathematical techniques to decode patterns of inheritance, gene expression, and disease spread. Mathematics in Epidemiological modelling is also aiding in predicting outbreak trajectories and guiding public health interventions.

Even disciplines traditionally distant from mathematics are now incorporating mathematical concepts. Historians, archaeologists and other social scientists are employing statistical analysis and mathematical techniques to optimize their work and gain insights into complex phenomena.

In summary this paper explores the role of mathematics and how it has remained an integral component of humanity's cultural heritage, shaping societal development from ancient civilizations to the present day.

Keywords: Mathematics, society, development and advancement, knowledge, science and technology.

## Science and Technology: Biology Characterization and Biotechnological Potential of Chalky Soil Rhizospheric Bacteria

\* Z e k a r i a s

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**Saloon  
Massawa  
Day 2  
4:50 – 5:10**



Mr. Zekarias has worked as a lecturer at Mainefhi College of Science for eight years. He is currently in the process of obtaining his PhD at Belgorod State Research University, Russia. He is studying Biotechnology. He has published eight articles and participated in six international conferences up to now.

Today's world is facing major global challenges, including food insecurity, environmental pollution, pandemic disease, antibiotic-resistant strains, and biodiversity loss. Scientific innovation and technology, specifically microbial biotechnology, are essential in tackling these issues. Our research focuses on exploring biotechnologically useful bacteria in chalky soil and applying them to address global challenges in the fields of agriculture, the environment, and health. Until this point, adequate numbers of chalky soil rhizospheric bacteria have been isolated and examined for their ability to promote plant growth, their antimicrobial activity, and their antibiotic sensitivity. Most of the strains studied, including *Streptomyces lasiicapitis*, *Streptomyces griseoaurantiacus*, *Janthinobacterium rivuli*, and unidentified strains labeled as EAE-1, EAE-3, EAE-14, EAE-40, EAO-17, and EAO-18, showed significant potential for biotechnological use. The unique morphology of the bacteria found in Eritrean chalky soil (EAE-1) had not been described before. This particular strain is likely to be identified as a novel strain. Additionally, the rhizospheric bacteria found in Eritrean chalky soil showed a significant level of resistance to various antibiotics

in comparison to the bacteria isolated from Belgorod chalky soil in Russia. In conclusion, bacteria in the rhizosphere of chalky soil may have a crucial role in addressing worldwide challenges.

Keywords: Chalky soil; Rhizospheric bacteria; Antimicrobial activity; Antibiotic sensitivity; *Streptomyces lasiicapitis*.

## Performance of Waste Paper as A Substrate for Oyster Mushroom (*Pleurotus ostreatus*) Cultivation

\* Sirak Berhe Okbasilasie, Tsega Mussie Ghebriel, Selamawit Teklemichael Hailemichael, & Tedros Gebrezgiabhier Gebreyesus (Department of Biology, Mainefhi College of Science, Asmara, Eritrea (East Africa))

**Saloon  
Massawa  
Day 2  
4:30 – 4:50**



Mr. Sirak Berhe is a graduate with a BSc in Applied Biology (2023) and a passion for sustainable agriculture. His research focuses on eco-friendly methods for cultivating oyster mushrooms using agricultural waste substrates, aiming to promote sustainability while addressing challenges in food security and waste management. During his

undergraduate studies, he conducted a research investigation, furthering his expertise in sustainable practices. He has one year of teaching experience at Shambiko and currently serve as a teacher at Sagem Junior and Secondary School in Teseney, Gash-Barka. His academic and initial scientific contribution reflects a commitment to education and environmental sustainability

**Purpose** Cultivation of *Pleurotus* sp., (Oyster mushroom) is economically feasible, exploiting its great capacity to degrade cellulose, lignin and hemicelluloses present in organic wastes. Waste paper is a very common pollutant thrown as garbage with no recycling plan in the environment. In view of the growing importance of food security and environmental sanitation this study was conducted to evaluate the performance of waste paper as a substrate for cultivation of Oyster mushroom (*Pleurotus ostreatus* L.), supplemented with sawdust and wheat bran.

**Method** Pure culture of *Pleurotus ostreatus* was collected from mushroom extension unit in Ministry of Agriculture and propagated using sterilized wheat grain as substrate for spawn preparation in Microbiology laboratory in Mai Nefhi College of Science. The collected waste paper along with the saw dust and wheat bran was mixed as per the design [four different substrate mixtures/treatments (T-1, T-2, T-3 and T-4) were prepared], composted for a week, filled in polyethylene bags and sterilized in an autoclave. Substrate bags were inoculated with Oyster spawn and incubated in a cultivation room with controlled conditions (light, temperature, humidity and ventilation). Data for growth param-

eters (mycelial colonization rate, growth performance, fruiting time, crop yield, biological efficiency and contamination rate) were recorded for each bag of each treatment, compared against the control group (records of these parameters from the mushroom extension unit, Ministry of Agriculture) and were analysed statistically using two-factor Analysis of variance (ANOVA) with replication technique.

Result Treatment-3 (T-3) showed high performance in terms of mean mycelium colonization time ( $18 \pm 1$  days), mean crop yield ( $180 \pm 2.1$  g) and BE ( $45 \pm 1.05\%$ ) were obtained from waste paper supplemented with sawdust and wheat bran; closely approaching the control group while a waste paper substrate alone without any supplement scores lower BE ( $13.92 \pm 1.95\%$ ). Based on the analysis of variance (ANOVA) this study shows that all the growth parameters were found significantly different at p-value ( $p < 0.01$ ) considering each growth parameter among the treatments.

**Conclusion** Therefore, waste paper along with required percentage of sawdust and wheat bran can be used as alternative substrate for cultivation of this prized mushroom reducing substrate expenses, adding a new food recipe to the Eritrean cuisine and reducing waste paper pollution on the environment on the other hand. Additionally, the cultivation package can be transferred to the local farmers.

**Keywords:** food security, growth parameters, performance, significant, substrate.

# Science and Technology: ICT

## A Systematic Literature Review on Teachers' Perception and their Readiness on STEM Curriculum Integration in Education

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Elias, Irene Musengamana &  
Francis Stonier (Southwest Univer-  
sity, Faculty of Education)

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**Saloon  
Akurdet  
Day 3  
11:10 – 11:30**



Background: It's critical to comprehend teachers' perceptions, attitudes, preparation, and beliefs regarding the methods and implementations of STEM-integrated curricula if schools are to offer high-quality STEM education. Teachers have a crucial role in helping students improve their critical and creative thinking skills since they have personal perspectives and experiences that might affect how they integrate STEM. This study uses a variety of existing literature to understand what is known about teachers' opinions, beliefs,

and attitudes regarding STEM curriculum integration in education.

Results: Empirical publications that matched the study's objectives and were published between 2013 and 2023 in English in scholarly journals (Springer and Web of Science databases) met the inclusion criteria. Twenty-four peer-reviewed scholarly articles were included in this systematic review after quality assessment. Finding themes within the data required the application of thematic analysis. The results show that while teachers hold favorable perceptions toward STEM education, there are still some obstacles to teacher's implementation of STEM including pedagogical difficulties, curriculum difficulties, structural difficulties, student anxiety, assessment anxiety, and a lack of teacher support. Teachers believed that peer collaboration, high-quality curricula, administrative support, prior experiences, and efficient professional development would all benefit their efforts to adopt STEM instruction.

Conclusions: Practice recommendations include quality in-service instruction over STEM pedagogy best practices and district support of collaboration time with peer teachers. Recommendations for future research are given.

Keywords: STEM Curriculum, Teacher perception, Teacher beliefs, Teacher readiness, in-service teachers, Systematic literature review.

## Looking Forward to Digital Development in Eritrea

\* Dawit Gebremichael (Software Engineer, Director, IT Operations & Infrastructure, Bloomberg Industry Group, Arlington, VA, 22202 USA)

\* Kiflai Gebremedhin (Elected Fellow of ASABE and International Professor Emeritus, Biological Engineering Cornell University, Ithaca, NY 14853 USA)

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**Selam  
Conference  
Centre  
Day 2  
9:10 – 9:30**



Mr Dawit Gebremichael joined Bloomberg Financial News and Commodities in New York in June 1997 after earning a Bachelor's in Biophysics with a minor in Computer Science from Johns Hopkins University. Two years later, he left Bloomberg and moved to Eritrea in August 1999 to establish Natna Business Solutions. Over the five years NATNA operated in Eritrea, developed integrated Management Information Systems (MIS) and customizable enterprise application software packages that

covered finance, accounting, payroll, HR, and project management modules. Our work in Eritrea was multifaceted. In addition to software development, we provided advanced IT training and deployed LANs and WANs for various public and private institutions. These included the National Commission for the Demobilization and Reintegration Program (NCDRP), the Project Management Unit for Emergency Rehabilitation Program (PMU-ERP), the Department of Environment, the Ministry of Information, Research and Documentation Center (RDC), the Seawater Farms Eritrea, and the United Nations Mission to Eritrea and Ethiopia (UN-MEE). Upon returning to the US in 2005, Mr Dawit rejoined the Bloomberg infrastructure team, eventually assuming the Director of IT Operations and infrastructure role at Bloomberg Industry Group in 2019. In his current capacity, he is responsible for maintaining and supporting consistent and predictable private and public hybrid cloud infrastructures while fostering an environment that promotes equitable training and professional development opportunities for managers and individual contributors.

In the contemporary landscape, a remarkable fusion exists between physical, digital, and biological systems, marking a new era characterized by rapid technological advancements. Innovations and breakthroughs occur at the interface of these systems, reshaping how we live, work, and interact. As

one of the developing nations, Eritrea must harness the potential of the digital age to propel economic growth, foster innovation, and build a knowledge-based economy. The application of Information Technology (IT) spans across various sectors of the economy, including banking, finance, healthcare, education, tourism, and more. In today's digital era, there is a pressing need for increasing adoption of mobile devices and widespread use of internet communication to facilitate seamless connectivity and access to information. Furthermore, entrepreneurial endeavors leveraging technologies such as 3D printing, artificial intelligence, and robotics hold immense potential to revolutionize different sectors of the economy, driving efficiency and competitiveness. The integration of IT presents lucrative investment and business opportunities for domestic and international stakeholders. Embracing IT as a business case enables the development of innovative solutions, products, and services that cater to evolving market demands and consumer preferences. Investing in IT infrastructure, research and development, and fostering a conducive business environment can unlock new avenues for economic growth and job creation. The youth emerge as the primary beneficiaries of IT-driven initiatives, representing our nation's future workforce and innovators. As such, there is a critical need to revamp educational curricula to incorporate IT-related subjects and skill development programs. By equipping

the youth with digital literacy, coding proficiency, and problem-solving capabilities, we empower them to thrive in the digital age and contribute meaningfully to the knowledge-based economy. Embarking on the global digital economy by leveraging IT innovations, investing in infrastructure, and prioritizing capacity-building is the way to sustainable development and prosperity. The objective of this paper will be to assess the current use of IT in the Red Sea State and articulate its potential applications in different sectors of the economy.

## **Shida Technologies: A Catalyst for Technological Transformation in Eritrea**

\* Theadros Mahari (Stockholm, Sweden, Independent Researcher)

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**Saloon  
Akurdet  
Day 3  
11:30 – 11:50**

# Oral Poetry and Ethnomusicology Research in Eritrea

## Eritrean Music and Musical Instruments: Ethnomusicology

\* Muhad Suleiman  
Ahmedin: (Commission of Culture and Sports)

\* Corresponding address: mohad-sulemanendu@gmail.com

**Saloon  
Mendefera  
Day 1  
2:30 – 3:00**



Mr. Mohad Suleman is an Ethnomusicologist and practiced researcher who worked extensively in music as an instrumentalist and music teacher in Eritrean National Marching Band for several years. He earned his BA. Honour Degree in Anthropology and Archaeology from the University Asmara, Eritrea and continued his postgraduate studies in Ethnomusicology and graduated from Shanghai Conservatory of Music, China. He is fluent in French, English, and Chinese, as well as in four out of nine local languages. He is UNESCO focal person for Safeguarding Intangible Cultural Heritage in Eritrea

and has designed, managed and coordinated numerous projects, workshops, trainings and seminars. He attended and contributed in several local as well as international conferences. Currently he is working in Commission of Culture and Sports culture researcher.

## Traditional songs of Tigrigna

\* Mehari  
Oqbamichael: ((Commission of Culture and Sports))

**Saloon  
Mendefera  
Day 1  
2:30 – 3:00**



Mehari Oqbmichael is a cultural researcher, poet, lyricist and song writer. He Holds BA degree in

Business Management from University of Asmara and attended several local and international short courses. He worked as an academic teacher in Warsay-Ykealo, Sawa for three years. He was a recognized columnist in national newspaper "Hasdas Eretra" for eleven years. He also contributed more than twenty articles in Youth and women local magazines. He wrote 40 songs relating to social, national as well as cultural affairs. Worked as culture researcher, designer and coordinator of national festivals in Maekel and Dehub regions of the country for fifteen years.

Recently, he is working in the Commission of Culture and Sports conducting research in Tigigna traditional songs and made it into a book expected to be published soon.

**Nara Awsetta:**  
**Nara Oral Poetry**

\*Dawd  
Adem Abushush:  
(Commission of Culture and  
Sports)

\* Corresponding address:  
Abushushd@yahoo.com

**Saloon  
Mendefera  
Day 1  
3:30 – 4:00**



He was student in both ELF and EPLF revolution schools. Today he is a linguist by profession and worked as a curriculum developer for one decade. He is a Poet, writer, film actor and Nara MT teacher for a long time. He participated in numerous national and international conferences and presented papers in different topics. He conducted several researches and surveys regarding Eritrean languages and cultures. Currently, he is working in the Commission of Culture and Sports of Eritrea as chief Researcher of Oral Traditions. He wrote more than 12 Nara books with one on way to be published soon on Nara language.

**Oral Poetry and Rites of  
Passage Research  
in Eritrea**

**Hilay Tigrayt:  
Tigre Oral poetry**

\* Moham-  
medsaid Osman : (Commis-  
sion of Culture and Sports)

**Saloon  
Dekemhare  
Day 1  
5:00 – 5:20**



Mohammedsied Osman is a cultural researcher, poet, lyricist, screen writer, and film director. He joined Asmara University Certificate programme in journalism, and graduated in 1999. Worked as teacher, educational radio programme producer and presenter in the Ministry of Education. He wrote one Tigre Anthology book, two Tigre oral tradition books, produced several radio and stage dramas, wrote future and serial films' screenplays, and directed more than 208 TV Serial films. Recently, conducting research in Tigre Oral poetry by collecting oral poems from different localities and developed a book expected to be published in the near future. Currently, he is working as Tigre cultural researcher in the Commission of Culture and Sports, In Asmara, Eritrea.

## **Initiation Rites of Passage in Eritrean Ethnic Groups: A Cross-cultural Study**

\* Zerisenai Andebrhan

**Saloon  
Dekemhare  
Day 1  
5:40 – 6:00**



Mr Zerisenai is a researcher at Cultural Affairs bureau of Commission of Culture and Sports. Born in 1987, Obtained B.A Degree in Geography, from College of Arts and social sciences (Adi keih). Currently he is working in finalizing his long time research “Initiation rites of Passage in Eritrean ethnic groups (A cross-cultural study). The project was initiated as part of cultural research project and funded by Research Fund of Eritrea’s Higher Board of Education in collaboration with Ministry of Education. As a freelance journalist, he has contributed several articles in local newspapers and magazines. He also contributed different Stories which was published by Hdri Publishers. He also writes direct several Feature Films, series films, and short films.

## **Sahot Afti Cadar: Saho oral Poetry**

\* Abdu Mohammed Ibrahim

**Saloon De-  
kemhare  
Day 1  
5:20 – 5:40**



Abdu Mohammed Ibrahim is cultural researcher, poet, lyricist, different article writer, joined Open Distance Education (ODL) program and earned Diploma in education in 2010. Worked as a teacher and school director in different schools. He produced more than 100 poems for Radio Program of Saho. He wrote more than 15 national and cultural lyrics as well as more than 10 school children songs. He translated Eritrean national anthem to the Saho language. He worked as a writer in youth magazine, which is called “Cindhamaso”. Recently, conducting research in Saho Oral poetry by collecting oral poems from different localities and developed a book expected to be published in near future. Currently he is working as Saho cultural researcher in the Commission of Culture and Sports Eritrea in Asmara.

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