UNIVERSITÀ DEGLI STUDI DI UDINE

RESEARCH DOCTORATE COURSE IN

ECONOMICS, ECOLOGY, LANDSCAPE AND TERRITORY

XXVIII CYCLE

RESEARCH DOCTORATE THESIS

THE NILE BASIN IN TRANSFORMATION: CHALLENGES, CONSTRAINTS AND OPPORTUNITIES

Thesis submitted to the Department of Civil Engineering and Architecture in partial fulfilment for the requirement of the award of degree of Doctor of Philosophy (PhD) at the University of Udine

Doctoral Candidate

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Coordinator:

Prof. Ting Fa Margherita Chang

Udine, Academic Year 2015/2016

Dedication

To my advisors professor Luca, Margherita, Ford, Vasco and Mauro

My parents, Salih and Nafisa,

My wife Amira

My sisters, brothers, and patient children

My family, extended families

To my friends and mentors, professors and colleagues

To my school friends, university mates and

To the humanity in the Nile Basin and the shared universe

I dedicate this humbe effort

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Content

Content summary

Acknowledgements

Working on this research project has been a challenging excercise for my personal capacities and ambition to produce a usefull and uptakable oucomes. My choice to focus on the Nile Basin rendered that option more challenging due to its vital importance and sensitivity from a political, social, economic, ecological, and developmental tied with other strategic angeles. Luckely, I managed somehow in away or another to bring on board significant highlights, insights and relative inputs usable for formulations of uptakable process of visioneeing. Most of the chapters and arguments discussed in the thesis have been published in scientific and other influential media outlets as well as in proceedings of international and United Nations conference, I am proud that this research has been selected and presented at the Milano Expo in 2015 as well as other workshop of intenational panels of experts on the Nile and transboundary basins. In that prospective, I would like to thank the following people who helped me with my dissertation:

Professor Luca Iseppi and Professor Margherita Chang for being my advisors, coordinators and mentors; they have patiently guided me from the inception of the idea of this dissertation; without their assistance all of this thesis and research outcomes would not have been possible,

My parents, Salih Mohamed Yassin and Nafisa Suliman Mohamed Hussein, sisters and brothers for their continued support throughout my academic endeavours, they have been in my corners cheering me on from kindergarten through my graduate studies; without their basic support this would not have been possible, my brothers Abdelhafeez, Fathelrahman and my sister Amna extended financial support and loans when needed, and I do appreciate that despite their limited capacities, they continued to encourage me to finish this thesis the moments I was about to give up.

Professor Vasco Boatto, my mentor and friend, for employing me as his research and didactic assistant while I worked to complete my graduate studies; he has introduced me to great networks and taught me a great deal about agricultural economics and policy formulation and conducting policy and action research, for which I am very grateful, he has extended helpful financial support and load during critical junctures of this research.

Many professors, researchers and graduate students for serving as my unofficial co-advisors in variuous discplines of my multidisciplanry domains ranging from Landscape, Ecology, Economics and Territorial studies and assisting me with the humble development of the theoretical framework contained and embedded in this dissertation,

Professors of Ford Runge for providing me the opportunity to be a visiting scholar at the University of Minnesota, together with Prof. Jay S. Coggins, for serving on my preliminary preparations for this dissertation, and for providing thoughtful suggestions and edits throughout the writing process and introducing me to the formidable staff of the University of Minnesota at the department of Applied Economics. I appreciate the kind invitations of the family Runge and the cultural events they have invited me to, the tours we did with prof. Ford will remain in my meomries to tell.

Sincere thanks goes to the executives, staff of the Nile Basin Initiative for hosting me in the NBI intitaive premises in Uganda, Rwanda and Ethiopia, providing access to Nile Basin Information and Knowledge repositories, and further facilitation of interviews with key informants, ministers, executives, information-retainers and knowledge-holders. Most of the interviews (ad exception of the intimate or off-camera ones) are posted in the candidate You Tube page https://www.youtube.com/user/MohamedSalihYassin and all the links are reported in the reference websites. There are more than 30 documenting videos realized in the fieldwork within the context of this PhD research such as the interviews with ministers of Water, Irrigation, Energy, and Electricity from the Nile Basin Council of Ministers entrusted with the Nile Basin issues. Example this video realized during the Nile Basin Development Forum, which took place in Nairobi in 2014 available at this website https://youtu.be/-Cb_aW2C2O8. Other interviews are done with Professor Mauro Bertagnin and posted in the same channel. The videos hasve shown significant number of visulaization and cited in many Nile Basin stakeholders' gatherings and conventional and alternative media outlets, especially the social media and some videos are shared by official institutions. The University of Udine has erected a corridor exhibition on the Nile Basin 2030 Vision elaborated by the Nile Basin Team organized by Professor Mauro Bertagnin and his assistants and myself as a referee and doctoral candidate, the results is shown in figures and interviews to illustrate the work done are conducted by the candidate and Prof. Mauro Bertagnin.

I do recognize the efforts of professor Paolo Ceccon, professor Laura Zampieri Studio CZ, Eng. Michele Zornita and professor Mauro Bertagnin for facilitating my field trips, follow-up and accreditation to the Milano Expo 2015, as a global professional research and practice exhibition outlet, for the presentation of the preliminary findings of the research project. Prof. Mauro Bertagnin has been engaged with me in the research project motivated by his lovely passion of Africa and long experience working in the African continient and with him we have travelled to Ethiopia to visit the Eastern Nile Technical Regional Office (ENTRO) and

had fruitful discussions with the director, staff, experts, friends and stakeholders, furthermore, with him we have enaged around 80 students in labrartory excercises to understand better the Nile Basin and developed a Nile Basin Vision and a University Exhibition demonstrating the outcomes of the various groups who tackled the integrated themes of the sustainability in the Nile Basin. Our friendly and professional collaboration has capitalized and yielded significant part of this thesis and seeded for potential further research and exective projects, which I intend to develop and implement along my future proessional carrier.

Dr. Amira Mustafa for being such a dear wife, mother of our kids and special friend, Amira and our children have been fundamental and patient with me to persue this work, even if they have many times complained because of my frequent absence and travel for the sake of this research and deduction of our household income, and being a great friend and helping me out of more paperwork problems than I would like to admit, for supporting me throughout the final writing and editing stage of this dissertation; their patience and encouragement have been greatly appreciated.

Personally and with my co-authors of the diverse papers would love to acknowledge the helpful support provided by the University of Udine, IPSAPA especially the president Prof. Livio Piccini and Prof. Mario Taverna, University of Padua-CIRVE, the anonymous referees for their invaluable comments and advice on the published papers. Dr. A. Babiker for read prove, and Mr. S. Clocchiatti for data collection and organization of the resource grabbing chapter.

All this thesis is principally financed thanks to the awarded scholarship, thought it is my effort and exercise, but I would like to thank all the unknown and tax payers in Italy, Nile Basin Countries, USA, myself included, for the merited scholarship made available for this important research.

Lastly, but not least, I am so appreciative and aknowledgeful for the referees who have contributed in the improvement of the final thesis and would like to anticipate my thanks and appreciation to the examining committee who will certainly encourage the continuity and upgrading and outscaling of this extendabe research project.

Riassunto

Mezzo miliardo di persone, il 42% della popolazione africana, vivono lungo i 6.680 km del bacino del fiume Nilo e la loro distribuzione è concentrata in città metropolitane che di fatto ne amplificano le problematiche socio-economico-ambientali. Questo territorio a fronte di vincoli significativi se gestito in maniera adeguata avrebbe enormi opportunità per il suo sviluppo sostenibile.

I principali temi, che sono anche le principali sfide del territorio, che ha affrontato la ricerca sono riferiti alla nutrizione e sicurezza alimentare, allo spreco alimentare, ai rifiuti urbani ed alla gestione delle risorse.

Il focus tematico e territoriale è risultato essere di importanza primaria per lo sviluppo e la prosperità di un'area che secondo le proiezioni demografiche raddoppierà la popolazione entro metà secolo.

I metodi utilizzati per la ricerca sono stati convenzionali e non: il questionario online, la E-consultazione, i viaggi di lavoro per le osservazioni dirette, la produzione della documentazione e la conduzione semi-strutturata di interviste, i seminari dedicati ed i gruppi di lavoro e di studio.

Nei viaggi di lavoro nell'area del Bacino del Nilo (Kigali in Ruanda, Addis Ababa in Etiopia e Kampala ed Entebbe in Uganda) ho condotto interviste semi-strutturate con informatori privilegiati (vari stakeholder governativi) ed i consegnatari pubblici delle aree, Nile Technical Regional Office orientale ad Addis Ababa, Nile Basin Initiative Secretariat a Entebbe e l'unità di coordinazione di Nile Equatorial Subsidiary Action Program a Kigali, che mi hanno messo a disposizione consistenti dati ho utilizzato per l'elaborazione.

I risultati ottenuti si sono tradotti in materiali che sono stati divulgati attraverso pubblicazioni, posters ed un documentario dedicato volti ad avvicinare gli stakeholder locali alle istituzioni internazionali.

Vista l'abbondanza di tematiche, attraverso la tesi viene auspicata la creazione di un osservatorio permanente che sia stimolo a gruppi di ricerca volti a monitorare le evoluzioni e le trasformazioni territoriali in essere.

Le questioni critiche hanno potuto essere riassunte in mancanza di visioni comuni e di legislazioni comuni, di politiche deboli di conservazione e gestione del

patrimonio nel Bacino del Nilo, in sistemi insediativi mancanti di fognature, nel non trattamento dell'immondizia, nella non gestione dei rifiuti liquidi e solidi, nell'assenza di scenari gestionali nei post-interventi infrastrutturali, evidenti sfide demografiche, la notevole e non pianificata crescita urbana, modelli sostenibili inadeguati degli insediamenti, carenti sistemi agroalimentari di approvvigionamento e di sicurezza nutrizionale e agro-alimentare nelle città/regione, accoppiati con le sfide connesse all'ambiente e massiccia emigrazione, principalmente verso l'Europa, ed immigrazione nelle metropoli.

I risultati attesi sono stati raggiunti e attraverso la tesi di dottorato "Il Bacino del Nilo in trasformazione: sfide, vincoli ed opportunità" sono alla base per la pianificazione di una futura ricerca.

Abstract

Almost half billion persons, constituting about 42% of the African population, live along the 6.680 Km of the river Nile. The disctribution of this Nile Basin population is largely concentrated in cities forming metropolitan city region patterns. The demograthic growth and urbanization are aggravating the problematic socio-economic and environmental challenges in the Nile Basin. The Nile Basin is conditioned by significant constraints to realize its sustainable development and reconcile with its nature conservation, issues which needs good governance and management to capture the enormous potential opportunities.

The major themes treated in this research entitled the Nile Basin in Transformation: challenges, constraints and opportunities has evidenced the also the major challnges facing the Nile Basin territories. These challenges range from the food security and nutrition, food and resource wastage, urban waste and largely the resources management.

The thematic and territorial focus resulted to be of primary importance for the development and prosperity of the Nile Basin in the light of its projected demograpgic growth and outlook, specailly when these projections are expecting a doubling of the Nile Basin population by the mid of this century.

The methods followed for this particular research expanded from the conventional methodologies to nonconventional innovative methodogies. The methodology included online simplified questionnaire and quick electronic consultation, successive field and work trips for direct obervations, production of documentaries, and semi-structured interviews with key and privileged stakeholders, policy-and-decision makers from the concerned insitutions and ministeries, in addition to dedicated seminars, workshops and working groups.

The research travels to the Nile Basin Territories, the doctoral research candidate went to seven Nile Basin riparian states, namely Egypt, Ethiopia, Kenya, Rwanda, Sudan, South Sudan, and Uganda and conducted semi-structured interviews in Kigali in Ruanda, Addis Ababa in Ethiopia and Kampala and Entebbe in Uganda and Wad Madani in Sudan, with previlaged informants and various governmental represetatives and misisters entrusted with the Nile Basin issues, in addition to long stay at the libraries and offices of the public intergovernmental

insitutions, in particular at the Eastern Nile Technical Regional Office (ENTRO) in Addis Ababa, Nile Basin Initiative Secretariat in Entebbe and the Coordination Unit for the Nile Equatorial Subsidiary Action Program in Kigali, where these insitutions have collaboratively provided relevant data and provided important information and confidential explanation. Subseqently the collected information is elaborated and completely or partially where appropriate reported in this thesis as agreed with that entities.

The obtain results and research findings are translated into dedicated publications, posters, presenations, documentaries, and other dimmenative format targeting local stakehoders, intergovermental and international institutions.

Given the numeristy of the themes and related critical isues emereged through this research, a permanent observatory or think tanks are recommended to be created to stimulate and support research groups and observers to monitor the continuious evolutions and territorial transformations occurring along the Nile Basin.

The critical issues and challenges could be summerized but not limited to the lack of common and shared vision and consensual legal framework and legislations, weak and fragile policies regarding the conservation of the Nile Basin heritage and and natural wealth, urban agglomerations lacking sewrage and waste managemanget systems and treatment plants for the liquid and solid urban waste as well as the industrial and agricultural waste, absence of post-interventional infrasctrural management and relative scenarios, evident demographic challenges, noteable and poorly planned urban growth and sprawl, appropriate and sustainable urbanization models, poor food secirty and nutritions systems at Basin-Wide level from the production to the consumption and along the value chain, supply and demand sides, challenging growing city region agro food systems coupled with the interconnected and interrelated environmental, socio-economical and migration fluxes and massive displacements, loss of human capital due to massive migration within the Nile Basin Riparian states and in particular towards Europe, and migration and exodus towards the cities and the metropolitan aggolomerations.

Briefly, th results and findings are achieved through this doctoral research thesis entitled “The Nile Basin in Transformation: Challenges, constraints and opportunities” consititute a solid base for planning of future researches and indepth studies.

Extended explanation of the research, the methodologies and the limitations

In the framework of the Doctorate Research in Economics, Ecology, Landscape and Territory XXVIII Cycle (2013 -2015), the candidate has attended the dedicated activities. Determined the thematic focus of the research to be of the Food Wastage, Urban Waste and Resource Management in the Nile Basin, the candidate affirms that the thematic and territorial focus proved to be of primer importance for the development and prosperity of the growing population in the Nile Basin. The candidate has worked on the thematic focus and has produced papers and posters related to the territorial focus of the research. The candidate successfully managed to create and establish strategic partnership with the Global Initiative Save Food based in the FAO HQ. which in turn is assisting in the peruse of field work planned for the second and foreseen for third year of the research as well as the subsequent dissemination of the research outcomes and its uptake by the concerned stakeholders and institution, the candidate has successfully gained a visiting scholar and research period in USA, University of Minnesota which is also demonstrated to be very keen in sharing the research outcomes and contribute in fining its final version. The candidate has conducted bibliographic research to determine the state-of-the-art in the thematic and territorial focus. The candidate managed to present the research project outlines and present posters in the premises of the FAO HQ, in the African Studies Centre of the University of Leiden in Netherlands in poster format and flash presentation, at the University of Minnesota USA in shared papers and seminars, University of San Francesco USA, at the European Association of Agricultural Economists congress in Ljubiana, Slovenia, in addition to other national, regional and international fora. As foreseen, the candidate managed to conduct a field research in the second half of the second year of the research to cover selected spots within some of the Nile States and for that attended the 4th Nile Basin Development Forum organized by the Nile Basin Initiative (NBI). The major purpose of the field trip was to depict current pictures of the state-of-the-art of the three thematic pillars of the research, conduct semi-structured interviews with privileged informants and concerned public stakeholders. The candidate will continue in compiling a questionnaire and continue conducting the semi-structured interviews with additional privileged informants and public stakeholders. Furthermore, the candidate agreed with the global forum on food security and nutrition of the

FAO to conduct a global e-consultation on the research focus. Honoring the invitation from the University of Minnesota as visiting scholar for six months with the main purpose of going deeper in the theoretical framework and scientific and applied research methodology and modeling yielded in identification of the Compact as suggestible framework and model to be followed and calibrated to fit within the purpose and scope of the research thesis.

In Summery:

The Research Problem(s) – focusing on the the Nile Basin major challenges, contraints and opportunities, as well as the food wastage, urban waste and resource management in the Nile Basin.

Research Purpose(s) – Knowledge improvement in the respective fields and territories in a multidisciplinary and basin-wide prospective

Research Methods – Conventional and online questionnaire, E-consultation, field work trip for direct observations, documentation production and semi-structured interviews conduction, dedicated seminars and workshops, reality studies tour.

Obtained Results - (Achievements 2013-2014) Published papers and posters, produced documentary, Improved Knowledge and Created Networks and Strategic Partnerships with prime international scholars and institutions. Erected personal Website for hosting the online questionnaire and promote the e-consultations as well as sharing the knowledge platforms.

Expected Results - (2013-2015) completion of the ongoing and accepted publications then final thesis submission, discussion and defense and planning for future research.

In the framework of the Doctorate Research in Economics, Ecology, Landscape and Territory XXVIII Cycle (2013 -2015), the candidate has attended the dedicated activities. Determined the thematic focus of the research to be “The Nile Basin in Transformation: Challenges, Constraints and Opportunities”. This emerged from the study of the major challenges, constraints and opportunities related to the food security and nutrition and in particular food wastage, urban waste and resource management in the Nile Basin, the candidate affirms that the thematic and territorial focus proved to be of primer importance for the development and prosperity of the growing population in the Nile Basin. The candidate has worked on the thematic focus and has produced papers and posters related to the territorial focus of the research. The candidate successfully managed to create and establish strategic partnership with the Global Initiative Save Food based in the FAO HQ in Rome, Italy, which in turn is assisting in the peruse of field work planned and conducted during the second and third year of the research as well as the subsequent dissemination of the research outcomes

and its uptake by the concerned stakeholders and institution, the candidate has successfully gained a visiting scholar and research period in USA, University of Minnesota which is also demonstrated to be very keen in sharing the research outcomes and contribute in fine-tuning its final version. The candidate has conducted bibliographic research to determine the state-of-the-art in the thematic and the Nile basin-wide territorial focus. The candidate managed to present the research project outlines and present posters in the premises of the FAO HQ, in the African Studies Centre of the University of Leiden in Netherlands in poster format and flash presentation, at the University of Minnesota USA in shared papers and seminars, University of San Francesco USA, at the European Association of Agricultural Economists congress in Ljubiana, Slovenia, in addition to other national, regional and international fora. As foreseen, the candidate managed to conduct a field research in the second half of the second year of the research to cover selected spots within some of the Nile States and for that attended the 4th Nile Basin Development Forum organized by the Nile Basin Initiative (NBI). The major purpose of the field trip was to depict current pictures of the state-of-the-art of the thematic pillars of the research, conduct semi-structured interviews with privileged informants and concerned public stakeholders. Furthermore, the candidate agreed with the global forum on food security and nutrition of the FAO to conduct a global e-consultation on the research focus. Honoring the invitation from the University of Minnesota as visiting scholar for six months with the main purpose of going deeper in the theoretical framework and scientific and applied research methodology and modeling yielded in identification of the Compact as suggestible framework and model to be followed and calibrated to fit within the purpose and scope of the research thesis. In the third year of the research program, the candidate continued in compiling the needed data after traveling thrice to the Nile Basin Territories, namely to Kigali in Rwanda, to Addis Ababa in Ethiopia and to Kampala Entebbe in Uganda and continued the conduction of the semi-structured interviews with additional privileged informants and public stakeholders, from the Eastern Nile Technical Regional Office (ENTRO) in Addis Ababa, Ethiopia from the Nile Basin Initiative (NBI) Secretariat in Entebbe, Uganda and Nile Equatorial Subsidiary Action Program Coordination Unit (NELSAP–CU) in Kigali, Rwanda. The research has yielded results of great impacts and influential values in the future policy-making for the Nile Basin community.

Critical Issues in the Nile Basin: Evidenced through the research and direct observation from the field:

Evidenced from the field trips and stay with various Nile Basin Territories, the research

observation shed major lights and brought insights on some critical issues, for that purpose it recommends creation of permanent laboratory and working groups to deal with that issues in updating and visionary approaches. Of course, there are plenty themes for a potential permanent laboratory to focus on, however, the following identified themes will allow to evidence and highlight potentially possible areas of collaboration, technical cooperation and scientific operation between the engaged and evolvable institutions.

1.1. Lack of shared visions:

The primary observation of generic characteristics is concerning the scarcity or inadequacy of shared vision on the principal challenges, which are of trans-boundary and global nature and are evidenced in the whole Nile territories of concern. Special focus will involve those Nile Basin territories, which are witnessing and foreseen to witness significant demographic, social and economic dynamics and environmental consequentiality.

1.2. Legislations:

Un important observation of concern is on the lack of, non-reinforced and un-harmonized legislations and legal framework especially on environmental issues of trans-boundary dimensions. There is huge gap between the theoretically set legislations and norms and its implementation on the ground and crude reality.

1.3. Heritage: Preservation And Management:

One of the primary observations is the need for inclusion of the heritage preservation, protection and management in the concerned territories, and that could be enhanced through transfer of experience and knowledge accumulated from the different UNESCO programmes such as the WHEAP programme, among others, and its pilot projects in the diversity of fields such as the Earthen Architecture.

1.4. Sewerage Systems, garbage treatment, solid and liquid waste management:

Another evident lacuna is regarding the sewerage systems and its management in relation to the dumping and drainage in the basins of different solid and liquid waste. That challenging situation has direct impacts on the ecological systems of the Nile Basin, which is directly connected to the continental and global ecosystems such as the Mediterranean ecosystem. The concern here is the water pollution and connected resource-base and ecological foundations. Missing is a comprehensive vision of models of absorptions of such massive solid and liquid wastes which should encompass the entire Nile Territory. Still mechanism and vision of reuse, recycle and conversion of such waste in useful resources are missing and need to be put in place to avoid future setbacks and ecological disasters. Vision

of recycling of strongly urbanizing agglomerations and growing metropolitan regions are badly needed.

1.5. Infrastructural post-intervention Scenarios:

Of strategic importance, is the construction of scenarios of the infrastructural post-interventions of great operas and infrastructures which will interest and impact on the territorial assets and concerned regions. Practically, it is dealing with better understanding, for instance, what will be the predictions of the possible impacts of great infrastructures such as dams, on the socio-geography in loci where that infrastructures are erected and beyond.

1.6. The demographic challenge:

Strictly correlated to the realization of the great infrastructures are the demographic aspects, which are consequentiality of the tumultuous growth of the populations, which is verifying in most of the East African territories and along the Nile Basin. Furthermore, that manifestations and phenomena are connected to the polarization capacities exercised by that important infrastructure, such as the dams which generate natural growth and accumulation of population and determine the natural resources management and governance through the very infrastructures and its connected assets and services, such as the planned dwellings and collective housing, schools, health centres and hospitals, roads, resettlements agglomerations. The unplanned and shaky visions of such impacts and growth will lead to the exaltation of diminishing equilibrium in the impacted territories. The demographic growth also requires a wise vision on its impacts on the existing great metropolitan areas in the region especially on the along the Nile Basin. From that prevision, harmonization, and control and management of those mechanisms of demographic development, a sustainable and equilibrated development and prosperity can prevail in the concerned Nile Basin and the whole East African territories.

1.7. The Urban growth and sustainable settlement models:

The demographic aspects following the tumultuous population growth, which is witnessed in the most of the Nile Basin territories in particular and in the East African region as a whole is generating increase in the dimensions of the great metropolitan areas in the capital cities and towns of most of the Nile Basin riparian states other than in the newly developed and sprawling urban agglomerations along the main rivers and water bodies and courses. All these phenomena require deep studies and research capable of suggesting appropriate and sustainable models of settlements other than identifying corrective measures and tools to the informal settlements, which are developing in a growing pattern around the urban centres. Furthermore, the improvement of the vernacular dwellings based on the

utilization of local materials and optimization of the constructive and construction culture of the diverse communities constitute a challenging current reality and above all for generations to come, and concrete answers and concerted actions to the sustainable development of the whole territories under focus.

1.8. Food Systems, Food and Nutrition Security: Challenges associated with the environment:

The necessity to guarantee the food and nutrition security in an ever growing, sprawling and densely populated areas, above all along the major rivers, tributaries and water bodies and streams is a domain of major importance. That needs visioning and modalities on how to integrate functional food systems in such concentrated urbanizing and problematic realities.

1.9. Immigrants/Europe:

Un important consideration which necessitate putting in action corrective strategies in concern of the evidenced facts that growing numbers of immigrants to Europe are stemming from the African continent, especially from the East Africa and Nile Region. That will lead to significant socio-demographic transformation and development.

In Summery:

The Research Problem(s) – focusing on the transformation in the Nile Basin, its Resource Management, broad challenges, constraints and opportunities.

Research Purpose(s) – Knowledge improvement in the respective fields and territories in a multidisciplinary and basin-wide prospective, depicting and overviewing of the near past, present and attempted to draw a future scenarios.

Research Methods – Conventional and online broad questionnaire, E-consultation, fieldwork trip for direct observations, documentation production and semi-structured interviews conduction, dedicated seminars and workshops, reality studies tour.

Obtained Results - (Achievements 2013-2014) Published papers and posters, produced documentary, improved knowledge and created Networks and Strategic Partnerships with prime international scholars and institutions with special stakes in the Nile Basin. Erected personal website for hosting the online questionnaire and promote the e-consultations as well as sharing the knowledge platforms and eventual interactions.

Expected Results - (2013-2015) completion of the ongoing research and the so far accepted publications then final thesis submission, discussion and defence and planning for future research.

The research has faced diverse obstacles and limitations connected to the limitation of

the financial funds. Knowing that the selected territory is vast, something which is intentionally desired by the research candidate to figure out a Nile-Basin-Wide comprehensive overview, therefore, the research had to drop some other thematic areas such as the food wastage along the Nile Basin, the Nile Basin cultural heritage, the agroecology systems of the Basin, aiming to retake it in future indepth research.

Thesis structure, articulation and organization:

The thesis is presented in 6 chapters as briefly described below:

1. Chapter 1: Introductory and summarizing remarks on the Nile Basin Community: Critical Issues, mainly Water but not merely.

2. Chapter 2: Resources grabbing in the Nile Basin: Misuse, Mismanagement and Misinvestment

3. Chapter 3: Human Rights in the Nile Basin: Between Sustainable Development and the Human Right to the Nile

4. Chapter 4: Agritecture transforming smallholder Agriculture in Africa: Earthern Underground architecture for a sustainable 2030 Nile Basin vision

5. Chapter 5: City Region Agrifood Systems in the Urbanizing Nile Basin Community

6. Chapter 6: The Nile Basin challenges and opportunities: Between transboundary cooperation and national territorial transformations

Each chapter has its own summary, biblioghraphy, filmography and/or Sitography for detailed description.

Preamble

This doctoral thesis marks the conclusion of three successful academic years of research work carried out at the then Department of Civil Engineering and Architecture of the University of Udine (DICA), which has splitted in the department of Agro-Food, Enviornmental and Animal Sciences and the politechnic department of Engineering and Architecture (DPIA) and the research doctorate team including the candidate has been transfered to the Department of Agro-Food, Enviornmental and Animal Sciences, meanwhile the candidate has been for a period of six month at the University of Minnesota as visiting scholar and subsequently has had frequent field trips and visits to the Nile Basin Region. During the research, the decision to treat the Nile Basin mulitipcity of issues is motivated by the imporatce and complexity of the territory of the Nile Basin, which is of great and vital importance for the candidate as well as it should be and above all the Nile Basin is influencing almost half of the population of the African continent, however, for better undertstanding and semplifications, the candidate has focused the research on the major challenges, constaints and opportunities behind the transformation occurring in the Nile Basin, that challenges are manifested in wide spectrum of problems ranging from the problem of food wastage as it is interconnected to the food and nutrition secuirty, of urban waste and resource management in the Nile Basin, which is *per se* derived from multiple motivations additional to my basic education, work experience and training. As the candidate is graduated, in fact, at the University of Khartoum in Agriculture (1994), optioned Agricultural and Rural Economy, and later earned post graduate formation and degrees from the University of Catania, Italy orgnaized jointly with University for Foreigners in Perugia and the Italian National Institute for Foreign Trade (ICE) in International Business for junior import-export managers (1996), another postgraduate proficiency degree in Rural Development in Developing Countries earned at the University of Padua, Italy (1998), in addition to anlougous postgraduate proficiency degree in International Development and Cooperation achieved at the University of Padua, Italy (2001), and finally a master's degree in International Veterinary Cooperation awarded at the University Padua, Italy (2010). Given the unique interdisciplinary nature of the doctorate in economics, ecology, landscape and territory, the candidate goal has been able to undertake a scientific study designed to identify comprehensive methodological tools and field work that allow or assist policy-and-decision-makers to identify plans and programs for the Nile Basin Stakeholders in the Nile Basin in a perspective that takes into account wide

range of challenges and opportunities for the Nile Basin as a common territory, such as the resource management, food and nutrition security and food wastage, urban waste, sustainable development and governance in the Nile Basin as unique territory with shared economics, ecology, landscape.

The partial and final results of the research were subject of presentations at conferences and publications as it is detailed below:

▪ At the XVII International interdisciplinary Scientific Conference of the IPSAPA. Udine (26 June 2013) - presentation "Resources Grabbing in the Nile Basin: Misuse, Mismanagement and Misinvestments." Co-authors Ting Fa Margherita Chang and Luca Iseppi.
▪ At the XVIII International interdisciplinary Scientific Conference IPSAPA, Catania, Italy July 3-4, 2014, presentation "Explaining Nexuses for Sustainable Agro-Food Systems in African Context: A Qualitative and Quantitative Approach", Mohamed S. M. Yassin, Maxwell Mkondiwa, C. Ford Runge –and the final paper is still to be published.
▪ At the European Association of Agricultural Economists Congress 14th Congress in Ljubljana on Agri-Food and Rural Innovations for Healthier Societies, 26 – 29 August, 2014, Food Wastage, Urban Waste in the Nile Basin: Challenges and Prospects for global healthy societies, Mohamed S. M. Yassin, Ting Fa M. Chang, Luca Iseppi, Ford C. Runge, a poster has been presneted and discussed at the conference.
▪ At the International Symposium on Agroecology for Food Security and Nutrition, 18 -19 September, 2014, The Nile Basin Agro-ecology: a Fundamental Base for Sustainable Food Security and Nutrition, Mohamed S. M. Yassin, Ting Fa M. Chang, Luca Iseppi, Ford C. Runge, a poster has been presented and widely shared from the FAO knowledge platform posted at the http://www.fao.org/3/a-at083e.pdf (Annex 4).
▪ At the Annual Scientific Symposium in Olsztyn, University of Warmia and Mazury in Olsztyn, Poland, Presentation entitled "The Nile Basin's heritage: between trendy sustainable development and territorial transformation"
▪ At the International Conference in Rome Article - "A Foodscape: informal place for sale and trade" M. Bertagnin, A. Covatta, M.S.M. Yassin, Rome, Italy
▪ At Wad Madani, Sudan in the International joint workshop organized by the Stockholm International Water Institute, The Nordic African Studies Center of Uppsala, and the Ministery of Water resource and electricity Hydrology Research Center Article - "Human

Rights in the Nile Basin: Between Sustainable Development and the Human Right to the Nile", Mohamed S. M. Yassin, Wad Madani, Sudan.

The Candidate research work was the result of multiple interactions with professors and researchers from the relevant scientific and great human qualities. My thanks go to the supervisor Prof. Luca, professor of Agricultural Economics and Appraisal, the PhD research cooridinator who have been pathfinders and meaningful in fine-tuning the methodological issues which are at the heart of the discussion.

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Purposely, The candidate would like to thank the University of Minnesota, Department of Applied Economics, Professor Ford C. Runge with whom he has spent six months as visiting scholar during which he could deepen the literature search and understanding on some issues addressed and availed the occasions know another academic world as well as personal living experience.

Countless are also the colleagues who in various ways contributed and encouraged the candidate to the realization of this thesis.

Globally, the intention of the thesis is to provide insights and foresights, which might help current and future generations in the concerted efforts for better management of the Nile Basin resources. Thus, a deep understanding that might be channelled through the Nile Basin Inititaitive (NBI) as a leading platform and intergovernmental institutional body engaged in the governance of the River Nile Basin.

Chapter 1: Introductory and summarizing remarks on the Nile Basin Community: Critical Issues, mainly Water, but not merely.

This study is an attempt for better understanding of the Nile Basin from an economic, ecological, landscape and territorial points and angles and perspectives. The study focused on identifiying some critical issues challenging the Nile Basin Communities affirming and highlighting that the Nile Basin issues are mainly water, but not merely.

The Nile Basin Initiative constitutes a major accumulative positive cooperation platform for the Nile Basin states, but still has its fragility and partial exclusivity. It is fragile in terms of its limited mandates and focus only on water as a single resource, though it is true that the water is the vital and driving asset for the Nile Basin cooperation and existence, however, The Nile Basin is not only or mainly and merely water. Also it is fragile because of its limited financial support and geopolitical polarization, frictions and sensitivity when it comes to historical conflicts. The Nile is a unifying identity for all the Nilotic riparian people, being Africans or Arabs or both, while the African orientation for the Nilotic people is resisted by the upper Egyptian and to some extend proportion of the Sudanese inhabitants and vice versa by the other components of the basin. It is partially exclusive because it does not provide full weight to all the Nile Basin States, as Eretria stands as observer. The Nile Basin does not have the same dimensions and magnitude of contribution when it comes to the single riparian country, while some members would tend to consider it as their own and exclusive asset with a narrative of national security. Fragile due to the weakness of a Nile-basin-wide sense of belonging, togetherness and mutual identity.

The Nile Basin community and institutions should have significant posts or excellent liaison offices in the various universities and research institutes in order to feed itself by graduates and researchers in the various disciplines and entrepreneurship. It should be job creator and stimulate creation of start-ups and business incubators. It should be an institution that thinks and operate out of the traditional boxes. It should provide enabling environment for the youth and young graduates and researcher(s) preferable through creation of innovative Basin-wide mobility. Most of the challenges of the poverty, rapid urbanization, growing demography and socio economic challenges, which are accentuated in the Nile Basin require mobilization of skilled human resources blended with robust financial and territorial capitals.

These interconnected and interdependent challenges cannot be addressed by a single riparian state in isolation of the others. The Nile Basin community should work hard and collectively to ensure achievement of the sustainable development, poverty reduction and reduce social and territorial exclusion, it is ought to provide special attention and affirm the importance of full youth employment, through better skills and upgraded capacities and designated specific trainings through the formal education blended with tailored innovations, knowledge upgrading and alignment, and experience sharing and stimulate financial support to harness social development in the coaching technical, vocational, educational, agricultural and healthcare domain. The Nile Basin community cannot move far without linking its strategies with the global development agenda 2030 and the regional agenda 2063. For the achievement of these agendas, synergies and accurate coordination is imperative. The active policy-and-decision-makers and influencers should be smart enough to realize that co-sharing, co-management, collaboration and cooperation is mutually and reciprocally beneficial for the Nile Basin collectivity. They should not let the divisiveness tendencies defeat their good wills of togetherness and common sense of belonging, destiny, solidarity and institutional empowerment. The collaboration and cooperation should be based on bold scientific basis, deep and broad understanding and genuine trust and all the noble principles of accountability, transparency, openness, sincerity, collective ownership, and subsidiarity.

Here the candidate is reporting some notions from my research findings and observations and would like to share it with the public to highlight and brings insights on critical issue that we as diverse stakeholders entrusted in steering the general policies concerning the Nile should bring to the discussion forum and may be consider what is appropriate for uptake and upscale, A Nile-Basin think tank might be suggested and financially supported to harness a Nile-Basin-Wide visioneering. The points are neither inclusive, however, I think it might be beneficial to embrace it in the boxes and go beyond it in a creative thinking out of the conventional schemes. In summary these critical Issues in the Nile Basin: Evidenced through the research and direct observation from field trips and stay within various Nile Basin Territories, the research observation shed major lights and brought insights on some critical issues, for that purpose it recommends creation of permanent laboratory and working groups to deal with that issues in updating and visionary approaches. Of course, there are plenty of themes for a potential permanent laboratory to focus on, however, the following identified themes will allow to evidence and highlight potentially possible areas of collaboration, technical cooperation and scientific operation between the

engaged and evolvable institutions. The combination of public-private-partnership plus the academia might be efficient and effective way to deal with these suggestions, which are enenmreted and reported hereafter.

1. The Critical issues and challenges

1.1 Lack of shared visions

The primary observation of generic characteristics is concerning the scarcity or inadequacy of shared vision on the principal challenges, which are of trans-boundary and global nature and are evidenced in the whole Nile territories of concern. Special focus will involve those Nile Basin territories, which are witnessing and foreseen to witness significant demographic, social and economic dynamics and environmental consequentiality.

1.2 Legislations

An important observation of concern is on the lack of, non-reinforced and un-harmonized legislations and legal framework especially on environmental issues of trans-boundary dimensions. There is huge gap between the theoretically set legislations and norms and its implementation on the ground and crude reality. Comprehensively lack of shared laws and reinformcement mechanisms.

1.3 Heritage: Preservation And Management

One of the primary observations is the need for inclusion of the heritage preservation, protection and management in the concerned territories, and that could be enhanced through transfer of experience and knowledge accumulated from the different UNESCO programs and its pilot projects in the diversity of fields such as the Earthen Architecture, among others.

1.4 Sewerage Systems, Urban garbage treatment, solid and liquid waste management

Another evident lacuna in most of the Nile Basin territories is regarding the sewerage systems and its management in relation to the dumping and drainage in the basins of different components of solid and liquid waste. That challenging situation has direct impacts on the ecological systems of the Nile Basin, which is directly connected to the continental and global ecosystems such as the Mediterranean ecosystem. The concern here is the water and environmental pollution and their connected resource-base and ecological foundations. Missing is a comprehensive vision of models of absorptions and appropriated of such massive solid and liquid wastes, which should encompass the entire Nile Territory. Still the mechanism and the vision of reuse, recycle and conversion of such waste in useful resources are missing and need to be put in place to avoid future setbacks and ecological disasters. Vision of recycling of strongly urbanizing agglomerations and growing

metropolitan regions are badly needed. Therefore, concrete actions are to be taken today before tomorrow in order not to compromise the future generations well being.

1.5 Infrastructural post-intervention Scenarios

Of strategic importance, is the construction of scenarios of the infrastructural post-interventions of great operas and infrastructures which will interest and impact on the territorial assets and concerned regions. Practically, it is dealing with better understanding, for instance, what will be the predictions of the possible impacts of great infrastructures such as dams, on the socio-geography in loci where that infrastructures are erected and beyond.

1.6 The demographic challenge

Strictly correlated to the realization of the great infrastructures are the demographic aspects, which are consequentiality of the tumultuous growth of the populations, which is verifying in most of the East African territories and along the Nile Basin. Furthermore, that manifestations and phenomena are connected to the polarization capacities exercised by that important infrastructure, such as the dams which generate natural growth and accumulation of population and determine the natural resources management and governance through the very infrastructures and its connected assets and services, such as the planned dwellings and collective housing, schools, health centres and hospitals, roads, and resettlements agglomerations. The unplanned and shaky visions of such potential impacts and growth will lead to the exaltation of diminishing equilibrium in the impacted territories. The demographic growth also requires a wise vision on its impacts on the existing great metropolitan areas in the region especially on the banks along the Nile Basin. From that prevision, harmonization, control and management of those mechanisms of demographic development, a sustainable and equilibrated development and prosperity can prevail in the concerned Nile Basin and the whole East African territories.

1.7 Urban growth and sustainable settlement models

The demographic aspects following the tumultuous population growth, which is witnessed in the most of the Nile Basin territories in particular and in the East African region as a whole are generating increase in the dimensions of the great metropolitan areas in the capital cities and towns of most of the Nile Basin riparian states other than in the newly developed and sprawling urban agglomerations along the main rivers and water bodies and courses. All these phenomena require deep studies and research capable of suggesting appropriate and sustainable models of settlements other than identifying corrective measures and tools to the informal settlements, which are developing in a growing pattern around the

urban centres. Furthermore, the improvement of the vernacular dwellings based on the utilization of local materials and optimization of the constructive and construction culture of the diverse communities constitute a challenging current reality and above all for the generations to come, concrete answers and concerted actions to the sustainable development of the whole territories under focus.

1.8 Food Systems, Food and Nutrition Security: Challenges associated with the environment.

The necessity to guarantee the food and nutrition security in an ever growing, sprawling and densely populated areas, above all along the major rivers, tributaries and water bodies and streams is a domain of major importance. That needs visioning and modalities on how to integrate functional food systems in such concentrated urbanizing and problematic realities. The Nile Basin community should consider its food and nutrition security as top and strategic priority before running to irresponsible investments aiming to secure elsewhere rather than securing food and adequate nutrition for the vulnerable people of the very Nile Basin community.

1.9 Immigrants / Europe

An important consideration which necessitate putting in action corrective strategies in concern of the evidenced facts that growing numbers of immigrants to Europe are stemming from the African continent, especially from the East Africa and Nile Region. That immigration and migration will lead to significant socio-demographic transformation and development. The Nile Basin institution can consider Nile Wide free movements of its citizens, and may adopt a sort of Nile Basin Community travel documents or laissez-passer. This might help easing the current tensions, frictions, smuggling and connected ill practices, and considering such measures, the Nile populations will have better circulation of goods, services, people as the Nile water is circulating through the entire Nile Basin States up to the Mediterranean basin.

1.10 Trail of new frontiers of multi-disciplinary sciences such as the Agritecture and annexed visions

What Agritecture vision for transforming the smallholder agriculture in the Nile Basin?

The Nile Basin sustains almost half billion inhabitants and foreseen to double its population within this century, causing a huge impacts on the environment, on the society and impacting the economy at local and global level. The Nile Basin is interconnected and interdependent in

its Agritecture policies and governance especially for the smallholder family farming systems. The on-going urbanization and Agrifood system in its current status-que revealed to be unsustainable, following its current pathways, which are not reconciling the nature conservation while launching sustainable development. The current development models are too much resource(s) demanding and resources consumptive in terms of energy, land, forest, water, biodiversity, fauna and flora and above all the human capital. To address such challenging reality, innovative approaches transcending the boundaries of the current disciplines are needed to anticipate a possible urbanizing population concentrated in limited spaces with limited sustaining resources. The emerging Agritecture and the connected Archifood can provide possible and potential sustainable solutions, options and vision, offering strong push to the urban planning, design, architecture incorporating agricultural farming and practices embedding the food and nutrition culture and issues for the benefit of the smallholders in the rural, peri-urban and urban context. There is a need of innovative and integrated disciplines, which require certain degree of permeability and flexibility of professional figures, policy-and-decision-makers and territorial governance. The Nile Basin institutions should encourage researches, which intend to bring into mainstream discussion on the Agritecture as a fundamental proposal for the visionary future of the Nile Basin and contribute to be a founding cornerstone throughout the following innovative methodologies in studying the Nile Basin territories in a sustainable developmental perspective.

Lastly, worth to notice that the Nile Basin issues and policies are highly influenced by biased and polarized media, often providing inaccurate and inflated information, misplaced statements and attributes, conflictive and divisive coverage and reporting, Nilotic-stereotypes, politically steered and incorrect propaganda, misperceptions and connected myth and misused platforms for tiny interest and services and narrow and shallow visions.

The sincere hope remain that all these points which the thesis has attempted to touch are prioritized and that it will be well tackled and cleared by the Nile Basin diplomacy in communitarian participatory approaches for the benefit of the whole Nile Basin community.

Chapter 2: Resources grabbing in the Nile Basin: Misuse, Mismanagement and Misinvestment

2.1 Abstract

Historically the Nile constituted the major source of life for million of inhabitants within its basin. It has been the cradle of ancient and prosperous civilizations. The Nile basin is rich in natural tangible and intangible resources, which are witnessing massive processes of grabbing in the recent decades. Resource grabbing is a complexity directly associated with the ownership and foreign direct investments. It is a challenging issue for the international juridical system in terms of transparency, accountability, fight against corruption, money laundering, human rights and national sovereignty, international development cooperation and humanitarian integrity. Sometimes, the emphasis on land or water grabbing alone might be generalized, bloated and exaggeratedly over reported, and the actors behind it might be misleadingly described. But, when we consider the overall and the complex impact and implications of realistic and dystopian outlook of resource grabbing and future prospective, one can realize that the challenges should be tackled in an accurate and deep long-term planning and comprehensive vision especially in the Nile Basin Territories.

The major causes of this resource grabbing marathon are attributable among others mainly to issues related to: a) food and nutrition security; b) climate change adaptation and mitigation; c) energy and water security; d) demographic instability, e) social and economic needs, f) ecological foundation, and g) regional polarization. Doubtless, resource grabbing will lead to non-sustainability in the sense that it deprives the interested population from their fundamental human rights and well-being. It will compromise the ecosystems integrity and basic capacities needed to sustain the human, fauna and flora in the Nile Basin. It has dramatic future consequences in terms of climatic and environmental dimension, social cohesion, political stability, and cultural heritage depletion, community economic resilience, appropriate governance and loss of developmental paths.

2.2 Introduction

The recent global financial, economic, food and fuel crises have stimulated massive investments mobilization by governments, multinational corporations, sovereign funds in addition to or combined with other actors in acquisition and long-term leases of large lands in the Nile Basin states namely in Burundi, Congo DR, Egypt, Eritrea, Ethiopia, Kenya,

Rwanda, South Sudan, Sudan, Tanzania, and Uganda (Figure 1 left). Alarming rates of land and water grabbing are occurring in all continents except Antarctica (Rulli *et al*., 2013).

The preliminary findings emerged that the estimated magnitude of the grabbed lands in the Nile Basin oscillates around 17 million ha out of the 55 million ha undergone grabbing in the African continent. Figure 1 (right). It is evidenced that the phenomenon is expanding.

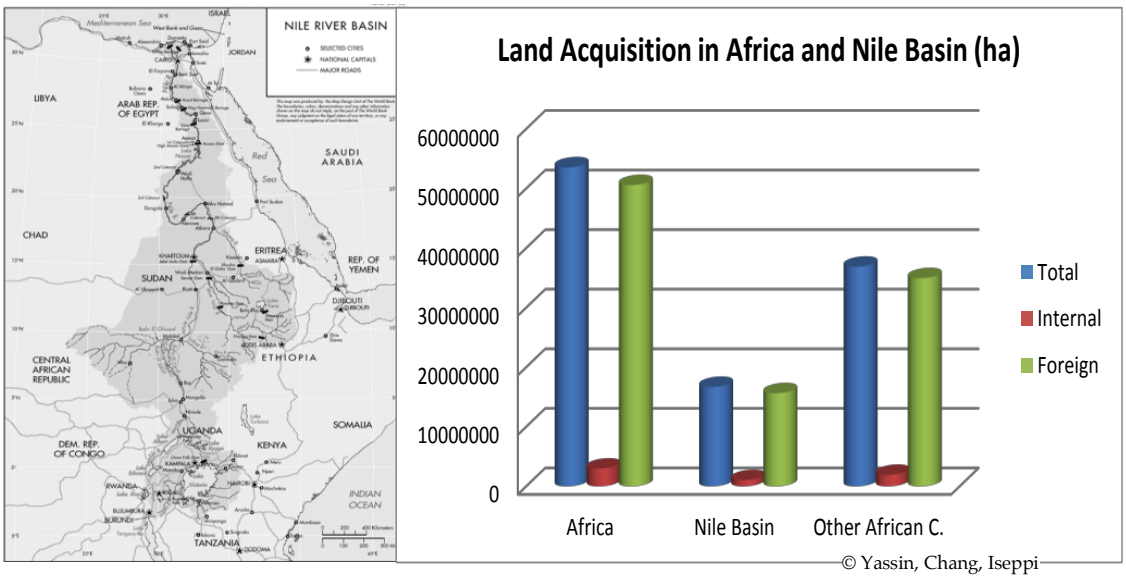


Figure 1. (left) **Nile River Basin map**; *(right)* **Land acquisition in Africa and Nile Basin (ha)**

Source: World Bank; Authors estimations and elaboration on Land Matrix Data respectively (accessed on 1st September 2013)

In Figure 2, the total investment in land acquisition has been evidenced as significant proportion within Africa areas and among different contracting phases: Intended, Contracts, Pending Contracts (under negotiation) and Failed deals. The degree of failure is revealed to be very low in Nile Basin as well as in Africa.

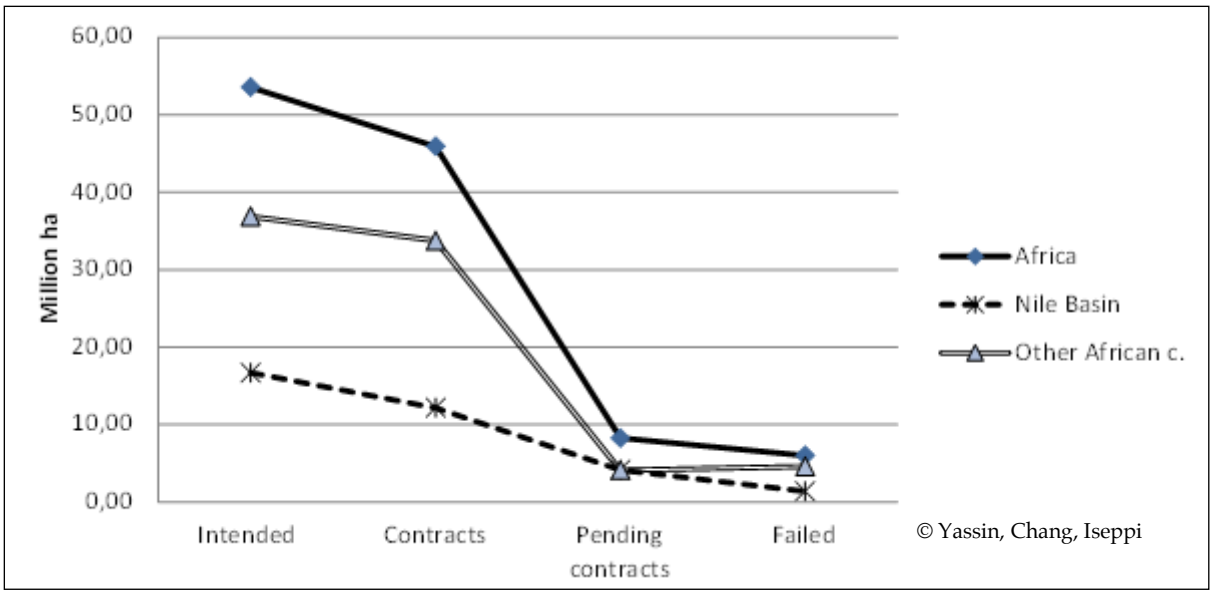


Figure 2. **Total investment in land acquisition in Africa and in the Nile Basin**
Source: Our Estimations and Elaboration on Land Matrix Data (accessed on 1st September 2013)

This eminently theoretical paper is intended to highlight the emphasis and the need of paradigm shifts. From single resource grabbing focus to a more complex tangible and intangible vision of embedded resources focus. For instance, the territorial grabbing implies a biocultural grabbing, which can be verified through the technique of the biocultural fingerprint (Chang, Iseppi, 2011a).

Specifically, at this research stance, the major objectives of this paper are the following: i) to highlight the emphasis and the need of paradigm shift from single resource grabbing focus to a more complex tangible and intangible embedded resources vision; ii) to better understand the recent situation of Resources grabbing in the Nile Basin; iii) to determine the type of investigation needed and underline the necessity of accurate examination through a possible appropriate model capable address the challenges related to resource grabbing in the Nile Basin context.

Frequently the major actors behind the resource grabbing are stemming from post-industrialized countries, highly industrialized and/or industrializing countries, states with excess of financial sovereign funds, multinational corporations, and least but not last, wealthy international and local entrepreneurs. These actors are seeking large scale arable lands with certain fertility status, in proximity of water resources, cheap labour costs, growing demographic trends, combined with future potential profitable business opportunities in non saturated markets with propensity of the proper governments to enter in partnership and

encourage such investments with *ad hoc* sustaining investment encouragement acts revealed to be widely unsustainable.

Resource grabbing is linked to the technological status of the investor countries as well as that of target countries. Oftenly, these investors are proposing their technological advancement, as they need to market their production in the targeted countries. That occurs through facilitated sells, long-term loans, instalment payments and evenly sometimes using the barter system for guaranteeing the production of raw materials. That chaffer generates a sort technological dependence.

In their propensity to attract foreign direct investments and to reduce the entry barriers, normally, the Nile basin countries enact encouragement regulations tending to oversimplification of investors entry in the interested country. In most of the cases, the grabbing actors assist in designing and drafting the investment encouragement act and the related legislations framework in a way that benefits their unannounced future aspiration. Thus, interfering in the regulations, legislations, laws and norms and traditions, which govern the resource ownership and land tenures. That form of hidden collusion is hard to verify. Governments tend to attract as much as foreign direct investments to boost their economic and financial capacities. If the investments resulted in depriving the local communities from their resource ownership, it would have reverse effects and would result in major negative socioeconomic impacts to be mitigated. As these investments are intended to boost the development and well-being of the local population in a context of win-win model, there are no clear and striking evidences of that reciprocal and mutual beneficiary relationship, since there is neither significant poverty reduction nor clear improvements in the living conditions registered in the vast majority of that resource-grabbed territories. Therefore, the model tends to be win-lose (development-involvement) and people in the Nile Basin remained in their squalor.

The lack of transparency and accountability in the natural resources management systems, the misuse of the collected capitals and the consequently resulted misinvestments in terms of misplacement, coupled with underestimation of cost for wit investors and overestimation of gains for target countries and the widely diffused corruption of the variegated actors involved render this tangible natural grabbing a huge challenge to be addressed by the local communities something which falls beyond their singular capacities especially under powerful and oppressive governments which tend to exclude their opponents and practice undeclared fight against the local opposing leadership.

Instead of Land Grabbing, the phenomenon is then definable as Resource Grabbing. Effectively Land, Water, Forest, and Air/climate and biodiversity Grabbing is a complex bundle as explained and represented in figures 3 and 9.

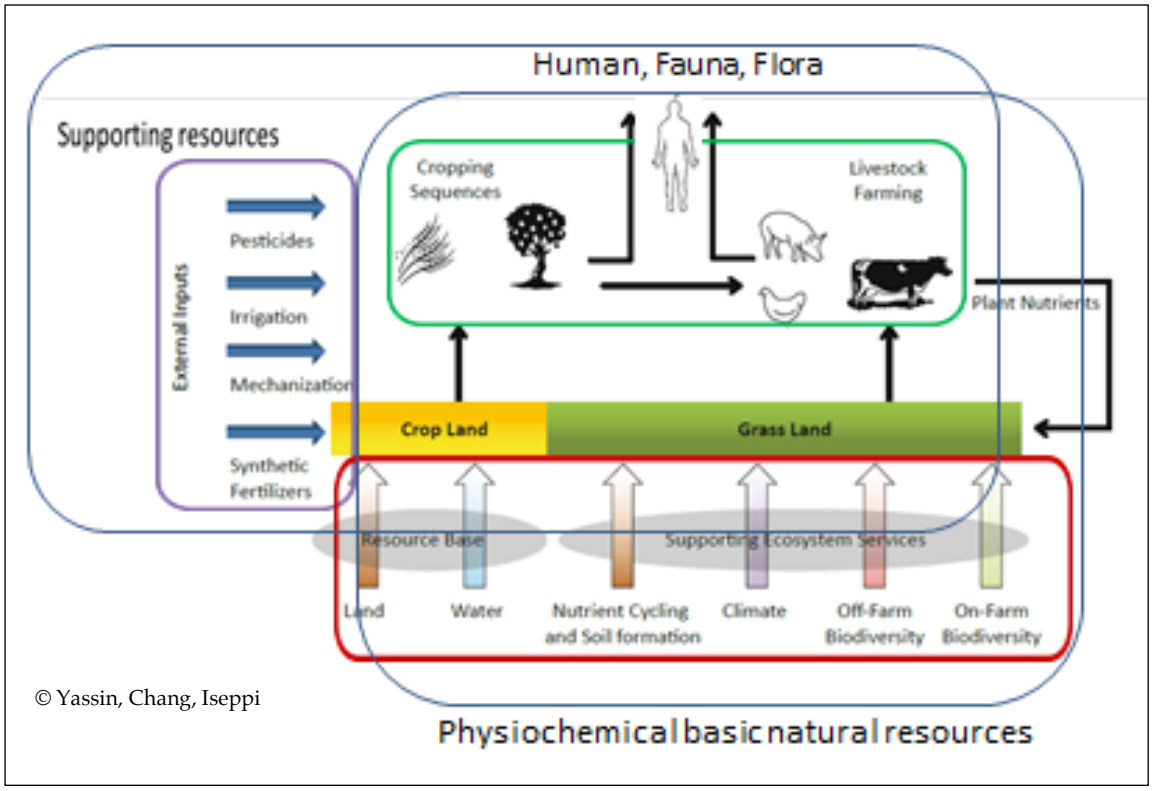


Figure 3. **Sketch of Complex Resources, "Principal resource flows and ecosystem services supporting Agricultural system"**. Adapted from the UNEP 2012 Report.

This sketch was originally reported in the United Nations Environmental Program report, but its shortcoming according to the author is that it is not report the Human factor and here the candidate is sustaining that the Human should be put at the center as the backbone of agricultural systems.

Some organizations and scholars argue that land grabbing is a pattern of new colonialism (Liberti, 2011), and recently resource grabbing has gained and will increase its gained momentum. In an era of much-polluted planet, the adaptation and adoption of the renewable resources path is revealing to be compelling and stringent need. In this context, the Carbon sequestration and credits trading is expected to high rocket. In particular, the biochar, which is a soil-amending element and recently traded and considered as a possible multiple win domain. In the Nile Basin context, there are no striking evidences of that unless it is sett in a form that considers necessary designing appropriate strategies of waste-based systems,

thus transforming the potentially wasted resources in economically viable, socially equitable and environmentally sound opportunities. The carbon grabbing will be explained in a wider extend since it is relative a novel.

2.3 Changing the paradigm from land to resource grabbing and Resource Grabbing Conceptualization

Land grabbing occurs when land that was previously used by local communities is leased or sold to outside investors, including corporations and governments. Traditionally, Land grabbing can not be considered a new phenomenon. For centuries, communities have been intimidated to abandon or have been forcibly removed from their land. Under the Kyoto Protocol, one can argue on the Green grabbing in which most advanced countries are allowed to offset their carbon emissions by buying carbon credits; in USA this happen through the participation in projects allocated in the developing world: the so-called Clean Development Mechanism (CDM). These credits or allowances can then be traded on carbon markets (European Union, 2008). Typically, the resources such as lands are taken over for commodity crops to sell on the overseas market, including for agro-fuel and food crops. However, land grabbing also occurs to clear land for tree plantations (grown for carbon offsets), protected reserves, mines and can often result from speculative investments when funds predict a high rate of return from land investments. Thus, when apparently only lands are subjected to grabbing, it include embedded a lot of resources, ranging from water, valuable nutrients, minerals, carbon sequestration capacities as well as non tangible dimensions such as the local cultural heritage in addition to the human capital indigenously inhibiting that lands. Not least the in-farm and off-farm biodiversity. Substantially, resource grabbing goes beyond the tangible resources. Therefore, it can be mentioned and highlighted that resource grabbing influence not only the human, fauna and flora in the interested territories, but all the complexity of resources embedded in those territories. It includes, land, water, climate, biodiversity underneath the soil, on the soil, and over the soil. As land grabbing also the resource grabbing is not a new phenomenon. Nonetheless, recently new aggressive and complex resource grabs are witnessed, driven by high food prices and growing global consumption, with multinational corporations often in partnership with governments, seizing the lands, waters, forests, natural minerals and incorporated with them common goods and the associated services (Chang, Iseppi, 2011b; 2012). Therefore, resources grabbing can be considered as multidimensional and multidirectional phenomenon in terms of time and space.

As a consequence, vulnerable peasants, herders, fishers and rural households especially in low income countries are being dispossessed of the means to feed themselves and their communities; local populations are being evicted and displaced, human rights are being violated, and the environment, as well as traditional community structures, is being compromised. Resource grabbing mainly refers to situations where powerful multiplayer actors disproportionally manage to benefit and take control of or divert valuable tangible, visible, hidden, embedded and intangible resources for their own benefits leaving the local and traditional owners with little and insignificant benefits and great long term losses. Meanwhile, favouring selfish and colluded actors, and consequently depriving, displacing and destabilizing local communities and jeopardizing their essential livelihoods and depredating the ecosystems necessary for their sustainable living.

2.4 Misuse, mismanagement and misinvestments concepts

Resource use and management are clear and straightforward practices undertaken by actors to maximise the utility of the exploitation of the resource base and the annexed natural resources. That can be explained in the proper use of lands, waters, forests, fauna and flora as large, while the management practices occur when business activities are run by actors in organized and coordinated patterns in pathways seeking maximization of profits and minimization of incurred cost, in addition to the merely natural resources, it involves the exploitation of the mechanical equipments and/or Human Labour and intellectual capabilities. Instead, the investments often are tied with attraction of financial capital and know-how needed to up-scale and up-grade the exploitation of the resources to generate employment, income, profits…etc.

In the Nile Basin context, frequently these investments are tied to foreign investors or locals-tied-to-foreign investors. The distribution among Nile Basin countries demonstrates the prominence of South Sudan with above of 30% both for intended and concluded contracts (Figure 3) followed by Congo D.R., Sudan and Ethiopia. The pending contracts under negotiation prevail in Sudan, Uganda, South Sudan and Ethiopia. The vast majority of the failed contracts are witnessed in Sudan followed by Kenya likely due to institutional complications.

Figure 4 shows the distribution of Land acquisition by country within the Nile Basin in which the former Sudan shares almost half as well as for the contracts. This implicates complication following the South Sudan independence (July 2011) because the deals were

negotiated before. Land matrix recalculation was done only on geographical allocation of the land rather than its geo-political ownership. The resource grabbing is a tool of political destabilization.

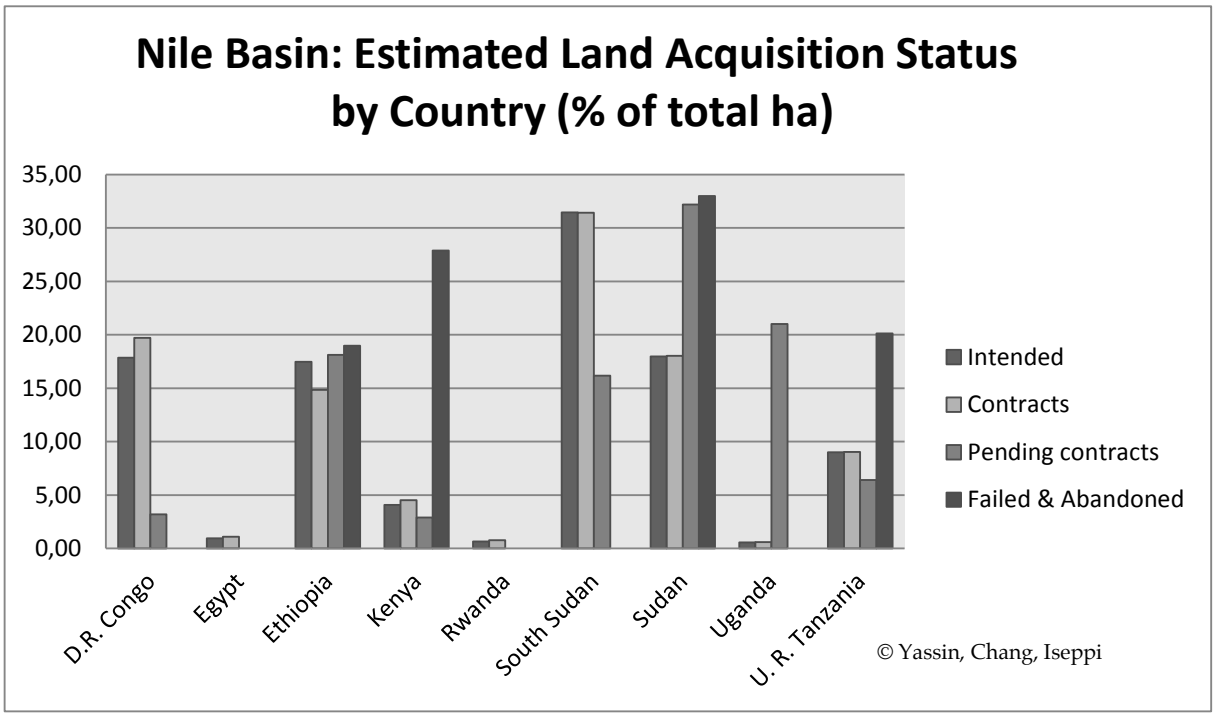


Figure 5. **Nile Basin: Estimated Land Acquisition**

Source: Our Estimations and Elaboration on Land Matrix Data

(Accessed on 1st September 2013)

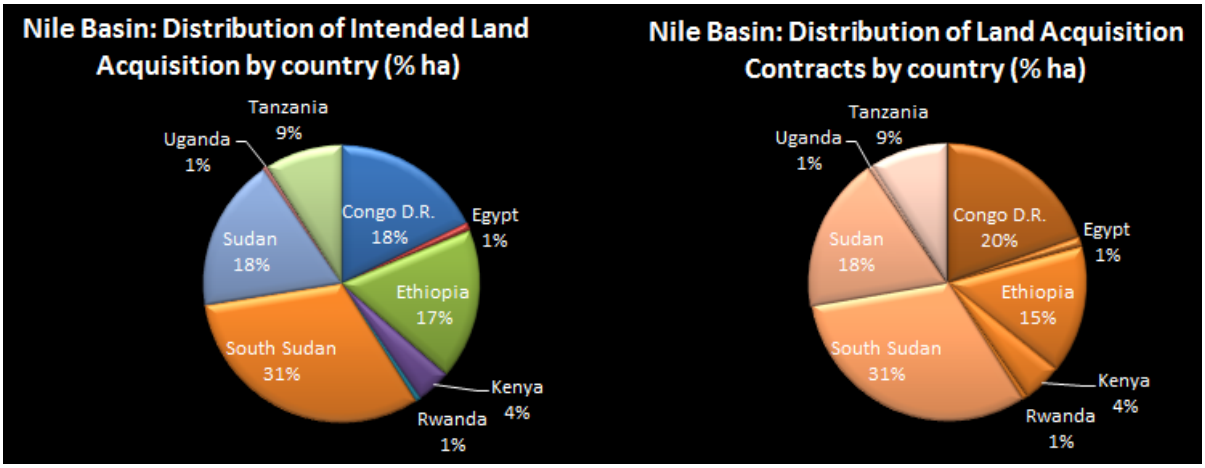


Figure 6. **Nile Basin: Distribution of Intended and Contracted Land Acquisition by country**

Source: Our Estimations and Elaboration on Land Matrix Data

(Accessed on 1st September 2013).

Ideally, that investments are intended to be reciprocally beneficial to the local and foreign investors, however, when the gain and loss tends to occur on only some ends and the others remain deprived, that is what could be denominated misinvetments. It is characterized with lack of shared benefits and lesser risks to the investors than the original owners of the resources. Therefore, misinvestments are harmful for at least one end of the investment chain and apparently beneficial to the other end in the short run. Clearly, in the long term, that misplaced investment and inappropriate allocation of resources, results harmful for both the recipient territories and the investing actors. As the misuse and abuse of resources by the variegated mismanaging actors results in conflicting business and generates gloomy business environment, in the long run, the consequence of that is missing or bad-practices results in disinvestments for the investors and loss for the hosting territories thus leading to divestments and consequently results as misinvestments.

2.5 Land grabs: development or involvement?

Land deals are very large in scope and take up fairly high percentages of the existing land resources in the host Nile Basin (NB) countries. It has impacts such as changing the cultivation patterns to agricultural intensification, desertification, soil and forest degradation, displacement of local populations, increasing local food insecurity and increasing poverty (e.g. the case of Kordofanian and Blue Nile territories in Sudan). In reality the necessity to intensify the agricultural production and the conservation of the agro-forestry ecosystem are two contrasting points, the founding element is the hydrological cycle alteration (Garlaschini, Calcaterra, 1999, p. 96).

Yet, consistent information about the final goal of investment in the different recipient countries is lacking (misinvestment and disinvestment). Deals in Ethiopia represent a far greater percentage of the agricultural area, and might lead to larger impacts on the local population in the country in the long run (Table 1).

Land resources and land deals in some NB countries						
Recepient country	**FAO land resource data (1.000 ha)**			**Land deals as percentage of**		
	Land area	**Agricultural areas**	**Forest**	**Land area**	**Agricultural areas**	**Forest**
Ethiopia	100.000	35.077	12.718	2.90	8.20	6.10
Sudan	237.600	136.773	66.358	1.30	2.30	1.60
Tanzania	88.580	34.200	34.433	1.90	5.00	2.50
Uganda	19.710	12.812	3.454	9.50	14.60	11.50
DR Congo	226.705	22.650	132.971	4.90	48.80	7.10

Table 1. **Land resources and land deals**

The magnitude of the land deals as a percentage of the total land areas, the agricultural area and the agricultural area plus the forest covered areas in each of the 5 main recipients in Nile Basin countries. Areas as of 2007.

Source: Land resource data from FAOstat, Land resource database (FAOstat, 2010)

Land grabbing as well as resource grabbing is directly associated with hunger prevalence. Sometimes the grabbing countries are grabbed country at the same time (e.g. Egypt). Note that there were successive and protracted hunger in the recent decades aggravated by up surging of recurrent land and resource grabbing in the Nile Basin (Figure 5).

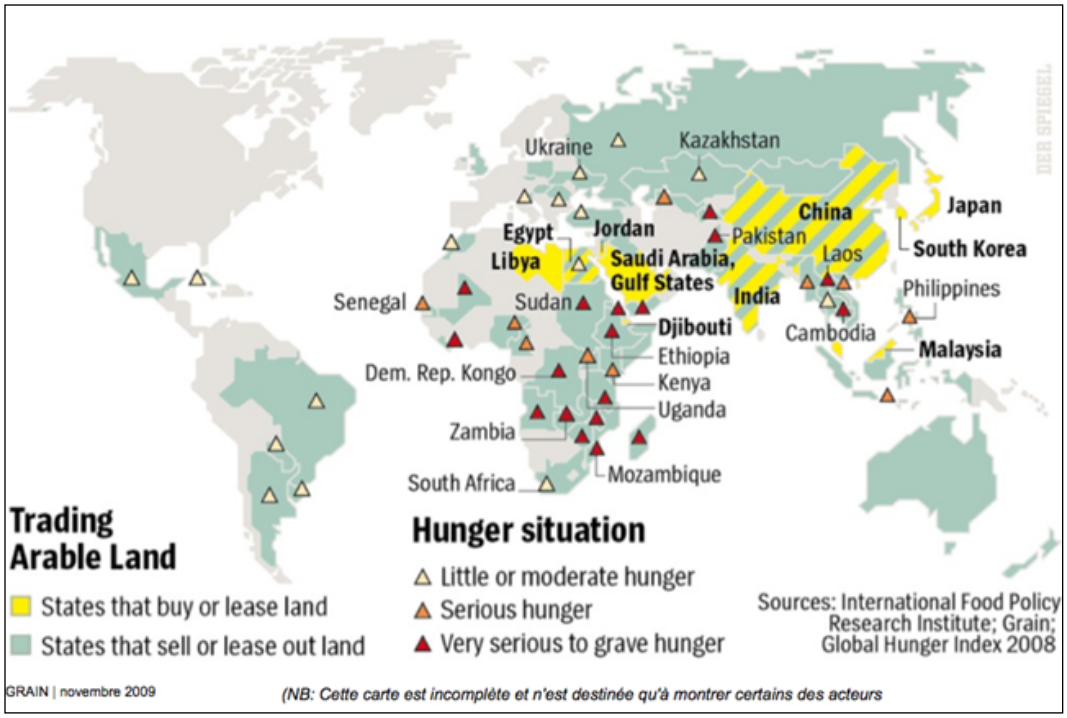


Figure 7. **Trading Arable Land and Hunger situation**

Source: IFPRI (2008) and Grain (2009).

2.6 Carbon credit in climate grabbing context

The carbon markets were instituted in 1997 by the Kyoto Protocol, which has imposed, in all industrialized countries adherents, to reduce the GHG emissions and to stabilize its concentrations in the atmosphere. This is for climate change mitigation and adaptation. The Carbon Market is a place where buyers and suppliers of carbon credits from industrialized countries (or companies within these countries) and sellers even from developing countries (or projects within them) meet, negotiate, exchange, seal deals and/or stipulate contracts (Sketch 2.). The carbon credits are sold as financial instruments on the carbon market and allow GHG emitting countries (generally post and industrialised countries) to offset their climatic pollution through presumed clean and renewable energy projects to be implemented prevalently in developing countries (Kettner *et al*., 2012). Over the years, this market has become a huge business. At present, the price value of carbon credits in the EU amounted to € 4 per ton while in Africa it is not yet clearly determined and need to be investigated. Prior to the global financial crisis (2007-8), some projections estimated that in EU the price per ton would reach € 30-40 by 2030. Carbon trading is a growing market; in January 2011, the global market was worth € 96 billion, with approximately 8.4 billion tonnes of carbon dioxide traded. This represents a 4% increase in value respect the previous year and a 19% cent

increase in traded carbon dioxide (IETA, 2012). There is not transparent figures and clear picture depicting the carbon trading in Africa above all within the Nile Basin where climate grabbing is assumed to take place. For instance, in the United States more than 48,000 farms are selling carbon credits through The International Small Group and Tree Planting Programme (Tist). Besides, the World Bank's Carbon Finance Unit's Bio-Carbon Fund, has developed a new soil carbon methodology approved by the Verified Carbon Standard. There are neither striking evidences nor concrete mutually beneficial business opportunities that the Nile Basin is sustainably included and benefiting from that world financial setting. Thought this methodology ought to help farmers adopt practices that build up the soil's organic matter, increasing its resilience to climate change effects, store more carbon in the ground (Ventures, 2012) and eventually allowing the farmers to earn carbon credits.

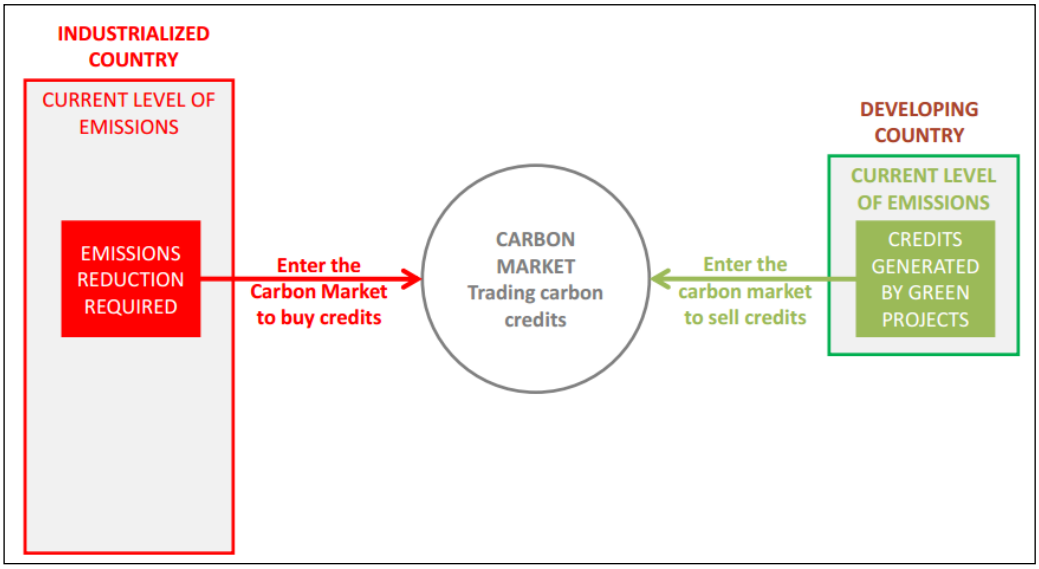


Figure 8. **Structure of the carbon market.** Source: Chingambo, 2012.

It is a sort of business as usual in the sense that the significant decisions are made by rich countries that pollute, while those who should break down the carbon footprint are actually the countries with low per capita income, but especially forestry resource-rich. Instead of striving to reduce GHG emissions, as required by the Kyoto Protocol, in countries where it is generated, these actors unload the burden on others using the same technique adopted by free riders. The technical-legal tool used is to acquire land abroad through direct investment so grabbing all the tangible and intangible resources involved in contracts including those relating to carbon credits. The theoretical framework of reference is the win-win model, but investors are well aware that less advantaged countries lack cohesion and miss a common policy. Therefore game theory effect of "prisoner's dilemma" takes over and, in the

fear to be damaged, each actor separately agrees with the counterparty (foreign investors) thus creating self-inflicted maximum damage as well as to other stakeholders. The tricky lesson does not yet seem to have been understood by target countries although for example some glimmer of idea seems to emerge from the newly formed association Africa countries in the AU 2063 Agenda with renascence visioneering.

2.7 Conclusive Remark

In win-win model is important the distribution of gains between domestic actors and foreign investors. The common pool of resources should be protected against harmful grabbing practices, well used, consciously managed and fairly exploited by suitable investors. By that, these commons can play a considerable role in upgrading the food and nutrition security, reducing extreme poverty, guaranteeing healthy and qualitative life standards. Furthermore, it will be useful in mitigating the negative externalities of the current and future climate changes affecting the local communities along the Nile Basin and beyond. Is this utopia? Rigid planning discourages foreign investors while no rules create dystopia. The importance of Regional cooperation over the Nile Basin as common-pool of resources far outweighs the potential conflicts over the very resources. Almost, what is needed is more regional integration spirit in sense of liberation, mobility and mobilization of social capital and better and equitable distribution of wealth and common resources from within the basin territories, above all the common water. That might seem Utopia, but realistically speaking and considering the exemplar experiences of the Danube and Amazon Basins, one can realize that the major success factor in that territories were the shifts from overwhelming conflictive atmosphere towards cooperative approaches. If the Game theory and its prisoner's dilemma is taken in consideration, it could be easily approvable that the fair competition and cooperation is a winning approach. That implies creations of common platforms stemming from the local, to regional, national, transnational long-term planning and strategic visioneering.

Worth to mention that the statistics reported in this article are changing with the continuity and evolution of the data from its sources. If we consider the database of the Auckland Instistute and its Land Matrix, we will notice that and if we combine or compare the data from another source such as that of GRAIN, the authers notice some discrepencies and heterogenity in the data, may be that is attributable to the difficulty in acquiring accurate and transparent data from the orginal sources of the studied or researched geographies. The ultimate goals of the authors are the conceptual framework rather than the accuracy of the data itself, though

the research in this front tackled with scientific methodologies and correct statistical instruments to the best knowledge of the authors.

The conceptual framework could be incorporated and amalgamated with the multidisplinarity of the thesis as sketched in the following figure 9.

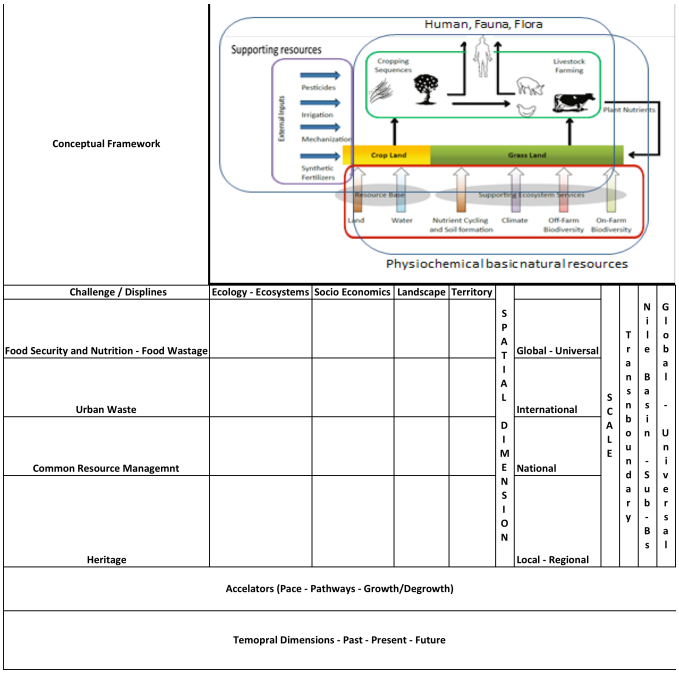


Figure 9. **Sketch of Complex Resources, "Principal resource flows and ecosystem services supporting Agricultural system combined with multidiscipiinary research matrix"**. Author 's Adaption from the UNEP 2012 Report.

This will allow deeper and punctual understanding of territorially based scenarios.

Furthermore, study of the Nile Basin institutional actors, riparian country position in the ongoing regional integration as shown in the following figure 10.

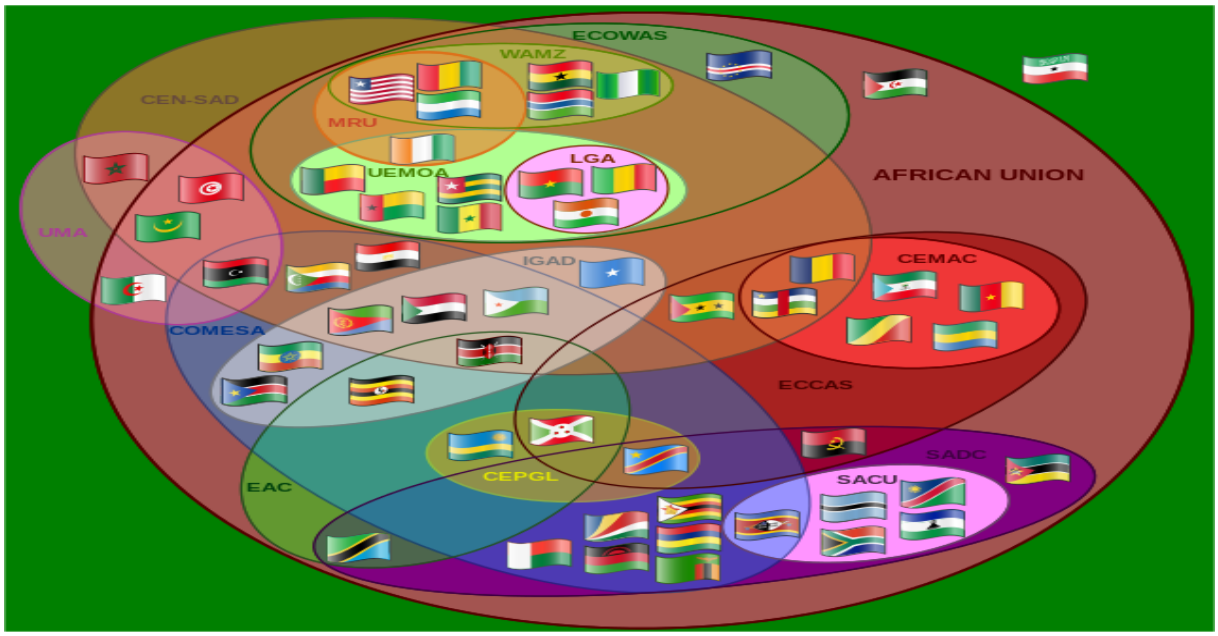


Figure 10. **The African Union member states and the African Regional Economic Communities (RECs).**

Within this context, and attempt to figure out a possible Nile Basin Regional Community is explored as shown the following figure 11, which is reporting the current African Regional Economic Communities (RECs). The current regional economic communities showed fragmentation and overlapping for the Nile Basin Riparian States.

No	Country/Rec	AU	COMESA	EAC	IGAD	SADC	CEPGL	ECCAS	NBI	UMA	CEN-SAD	ECOWAS	WAMZ	MRU	UEMOA	LGA	CEMAC	SACU
1	Burundi	YES	YES	YES	NO	NO	YES	YES	YES									
2	Congo DR	YES	YES	NO	NO	YES	YES	YES	YES									
3	Egypt	YES	YES	NO	NO	NO	NO	NO	YES									
4	Ethiopia	YES	YES	NO	YES	NO	NO	NO	YES									
5	Eretria	YES	YES	NO	YES	NO	NO	NO	NO									
6	Kenya	YES	YES	YES	YES	NO	NO	NO	YES									
7	Rwanda	YES	YES	YES	NO	NO	YES	YES	YES									
8	South Sudan	YES	YES	NO	YES	NO	NO	NO	YES									
9	Sudan	YES	YES	NO	YES	NO	NO	NO	YES									
10	Tanzania	YES	NO	YES	NO	YES	NO	NO	YES									
11	Uganda	YES	YES	YES	YES	NO	NO	NO	YES									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Figure 11. **African Union member states, the African Regional Economic Communities (RECs) and Nile Basin Riparian States.**

It is notices that the Nile Basin Initiative could be a new regional economic community, if the transboundary cooperation is harnessed and enhanced and once the dispute of competitive nature on the water issues are turned to a more and effective cooperative spirit.

South Sudan is a new Nile Basin Riparian state and still it has disputed boundaries with Sudan, therefore, tackling the Nile Basin issues in cooperative and transboundary dimension might over come this huge challenge, especially if we consider that the Republic of South Sudan can not endorse all the Nile Basin agreements stipulated prior to its independence from Sudan. The following figure 12 shows the disputed boundries and the natural and conflict at stake.

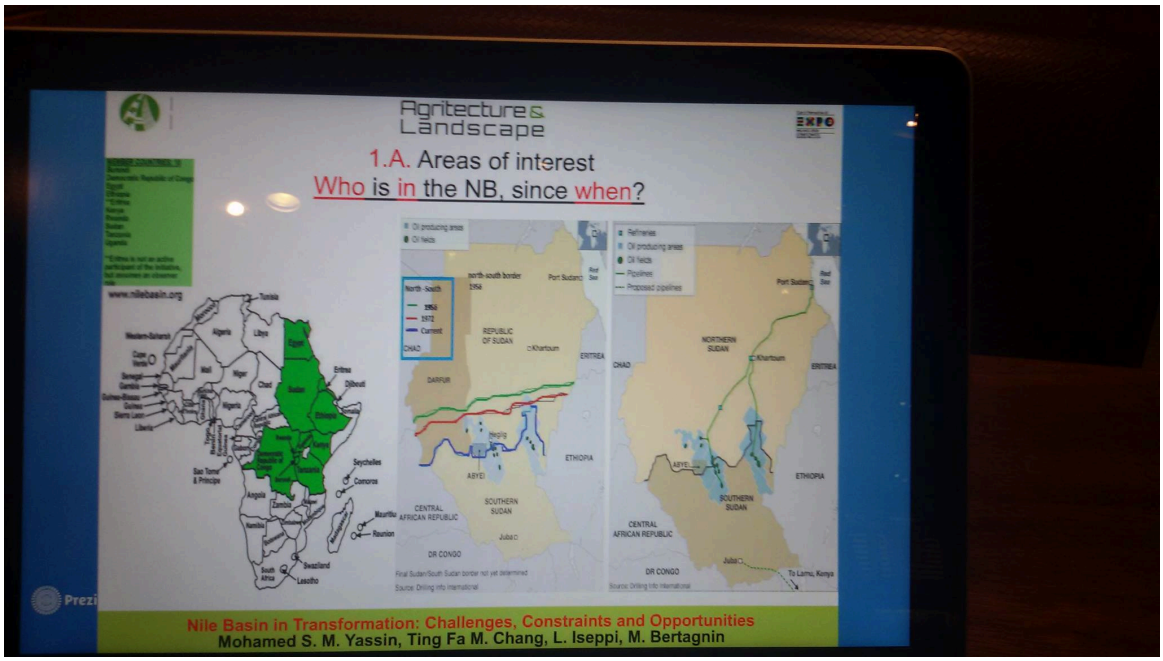


Figure 12. **The Nile Basin States sketching the disputed boundaries between The Sudan and The Republic of South Sudan**

Still the population statistics of Sudan and South Sudan are contested, because the Republic of South Sudan has inherted that statistic from the former united Sudan and there were a huge bias when the census are conducted. However, for convience, the population of these countries are conventionally and conviently considered for reasons of simplication till better statistics and censuses are conducted.

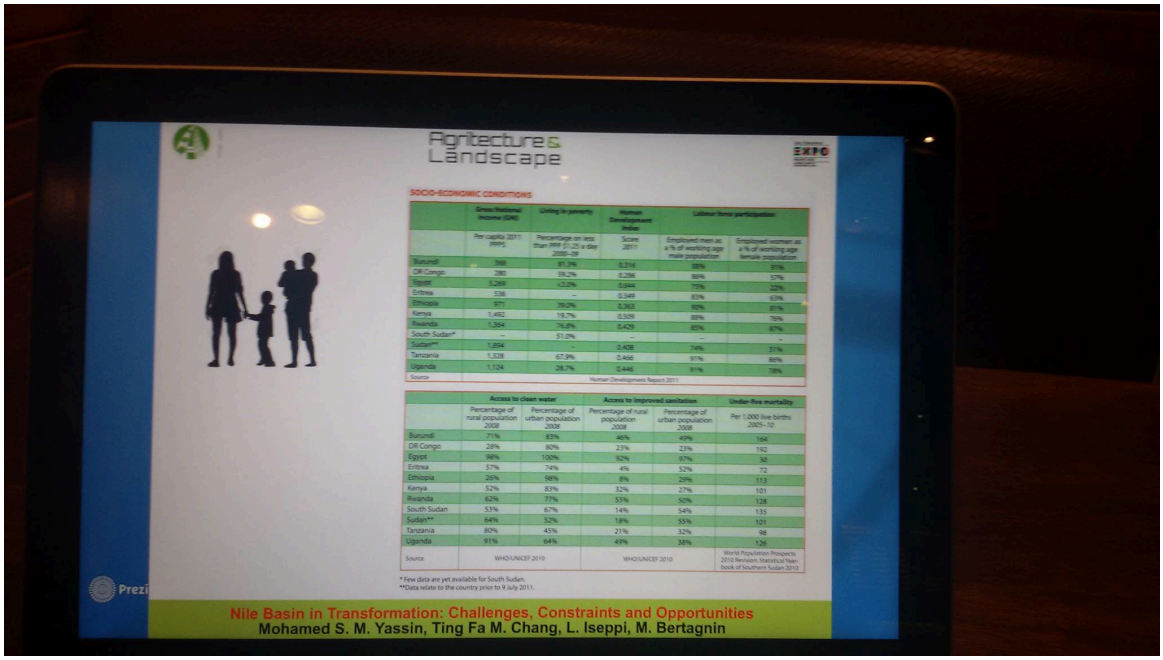


Figure 13. **Nile Baisn Riparian States population**

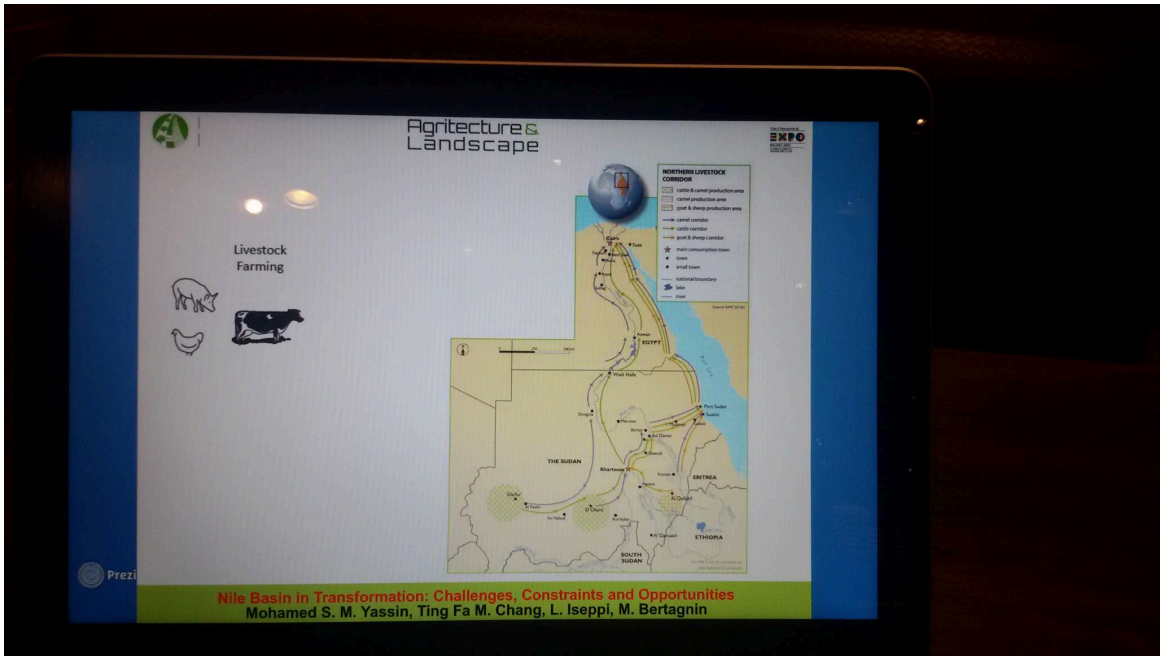


Figure 14. **Sketch of Complex Resources, "Principal resource flows and ecosystem services supporting Agricultural system combined with Fauna of the Nile Basin system"**. Author 's Adaption from the UNEP 2012 Report.

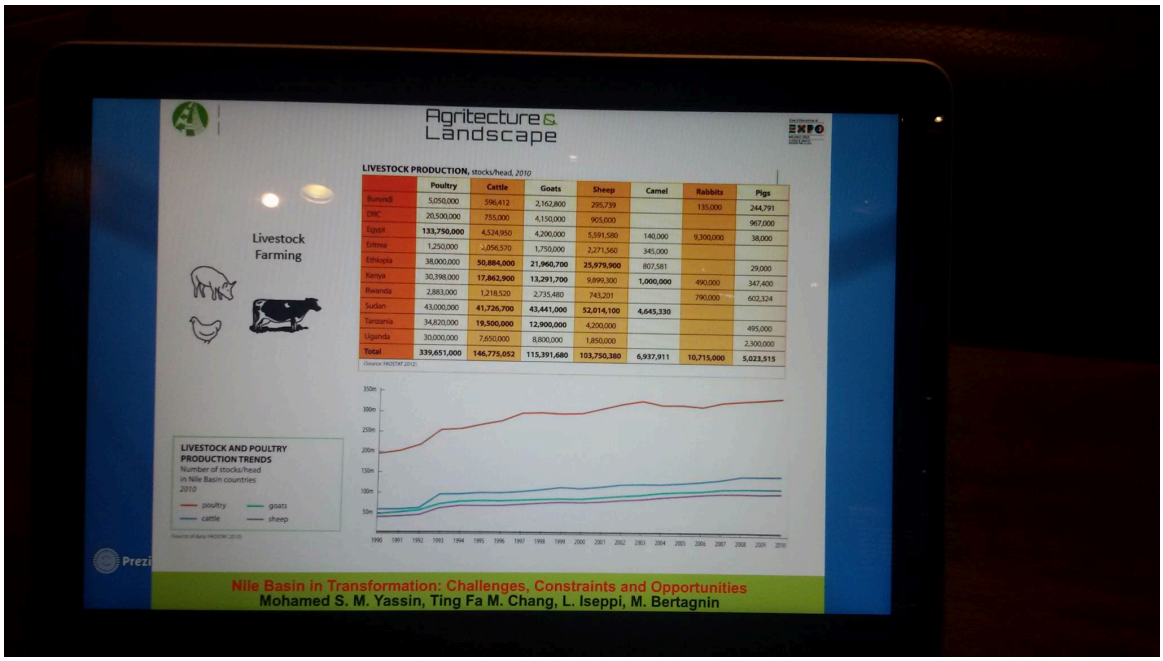


Figure 15. **Livestock and poultry production and trends in the Nile Basin Riparian States**

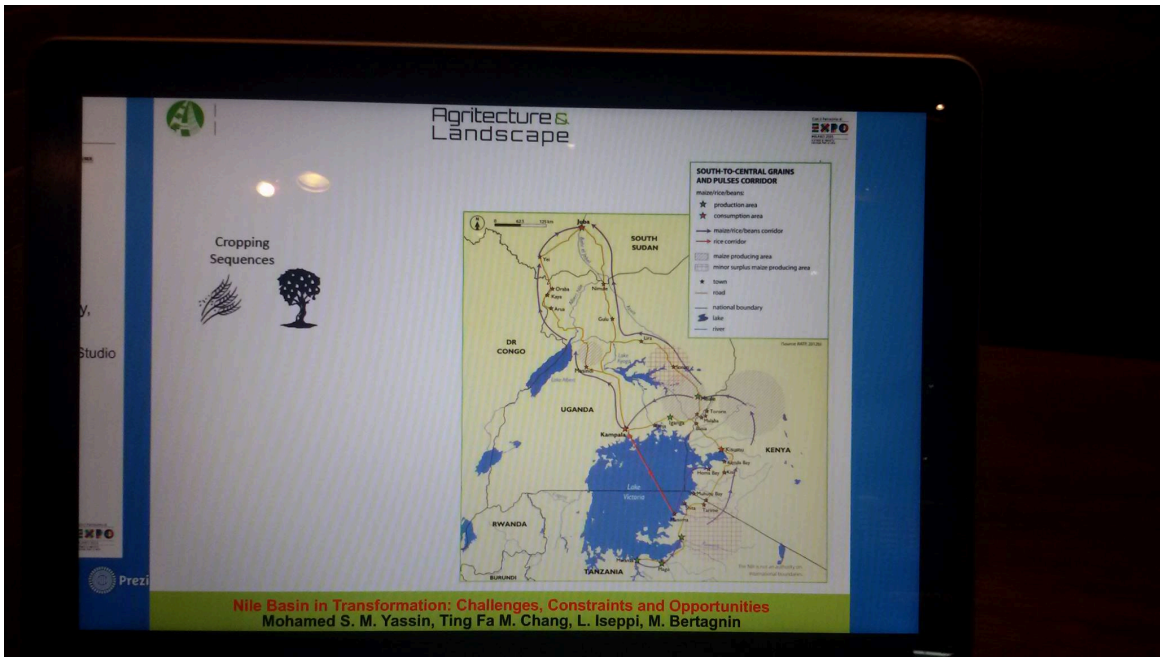


Figure 16. **Regional trade of cash and food crops of the Nile Basin Riparian States**

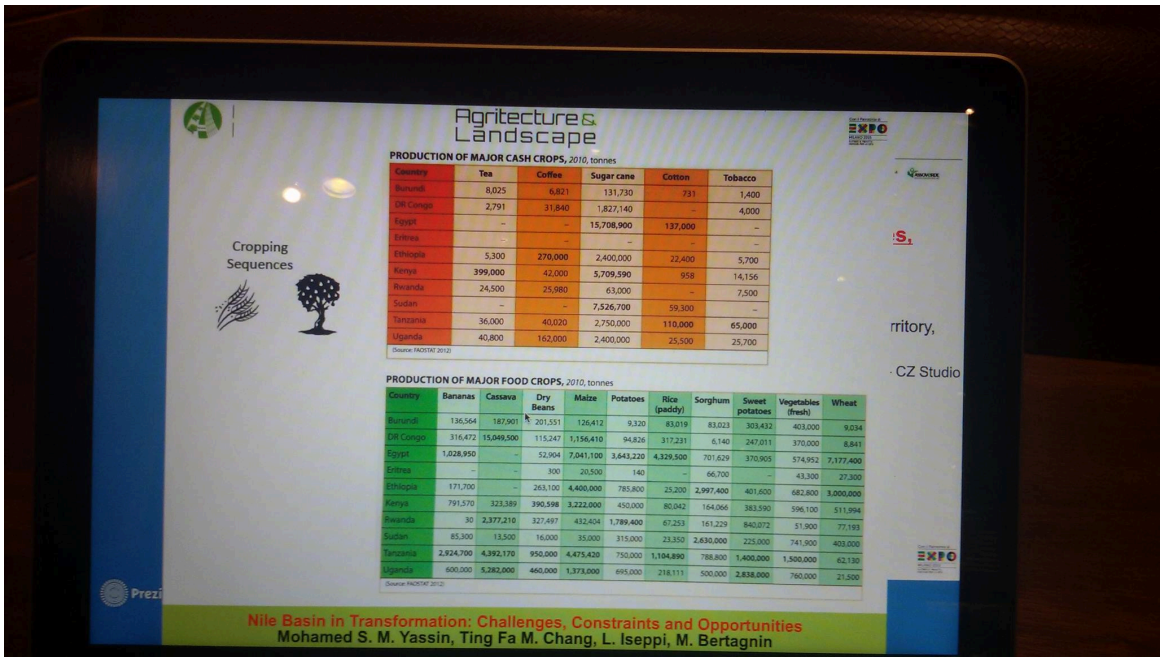


Figure 17. **Production of major cash and food crops of the Nile Basin Riparian States**

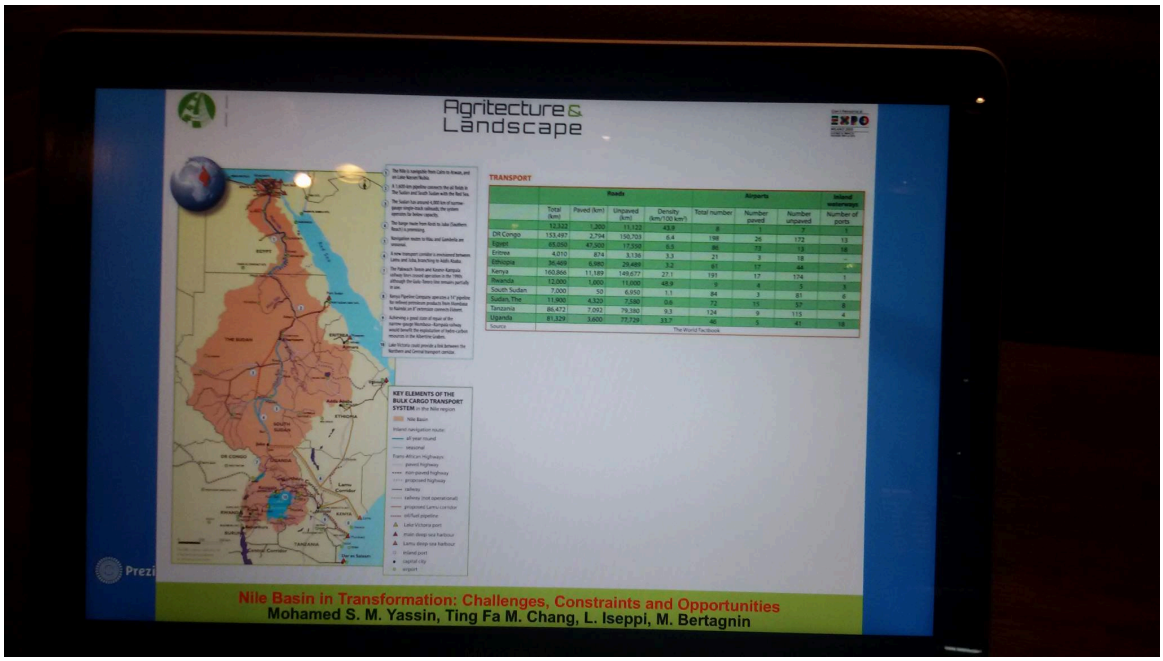


Figure 18. **Production of major cash and food crops of the Nile Basin Riparian States**

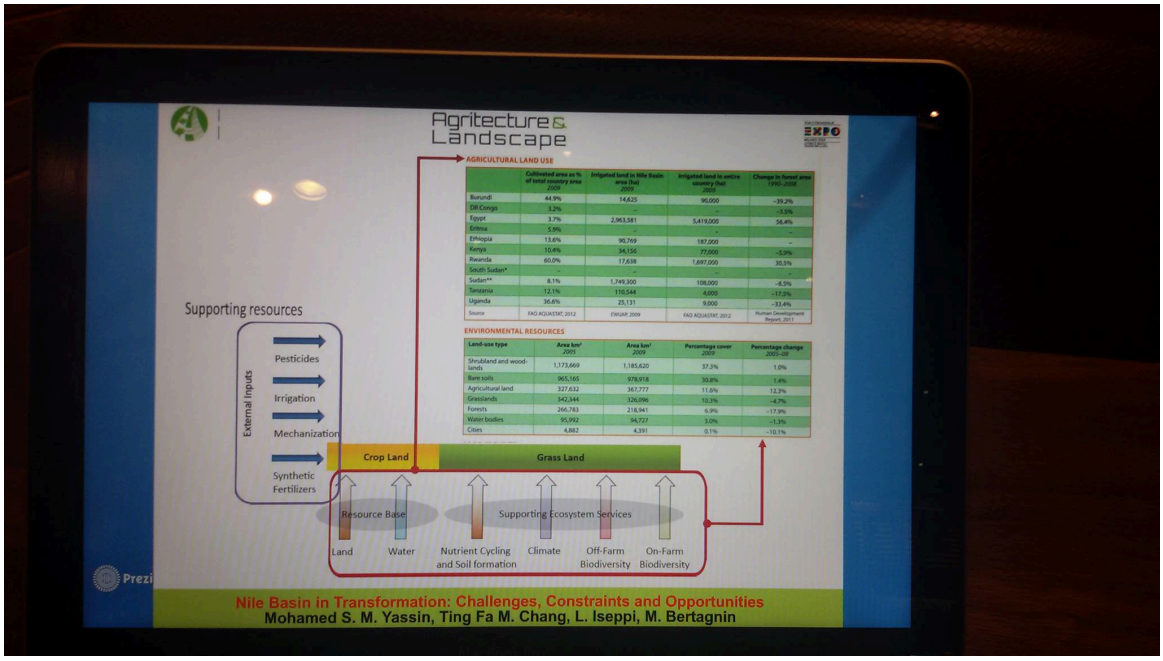


Figure 19. **Production of major cash and food crops of the Nile Basin Riparian States**

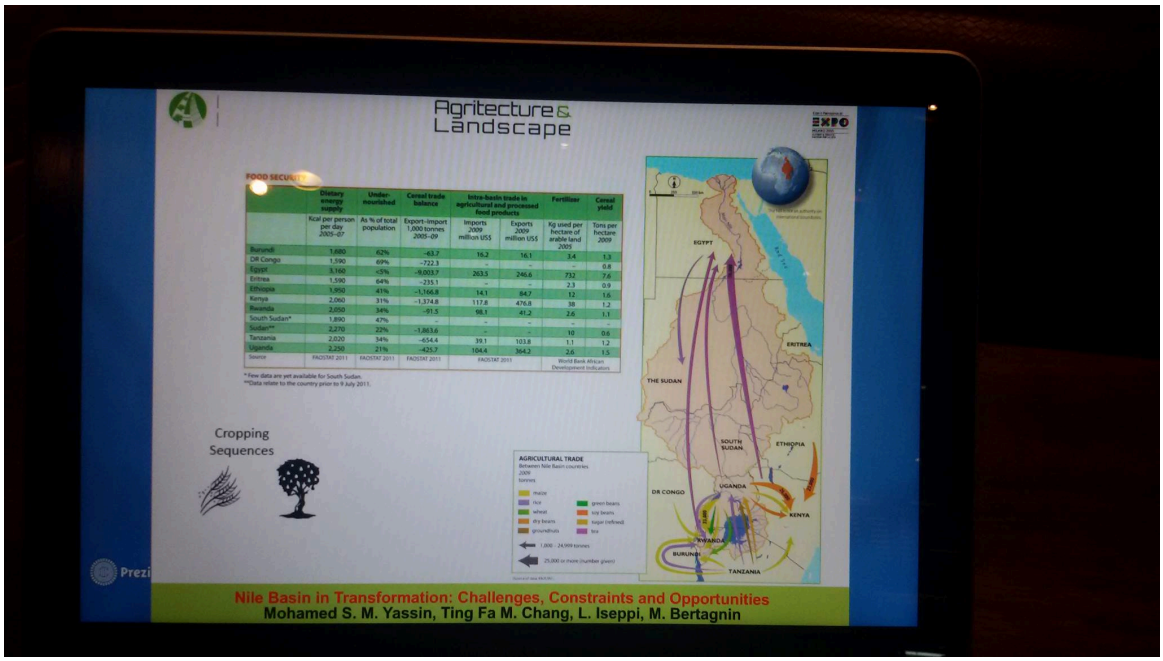


Figure 20. **Production of major cash and food crops of the Nile Basin Riparian States**

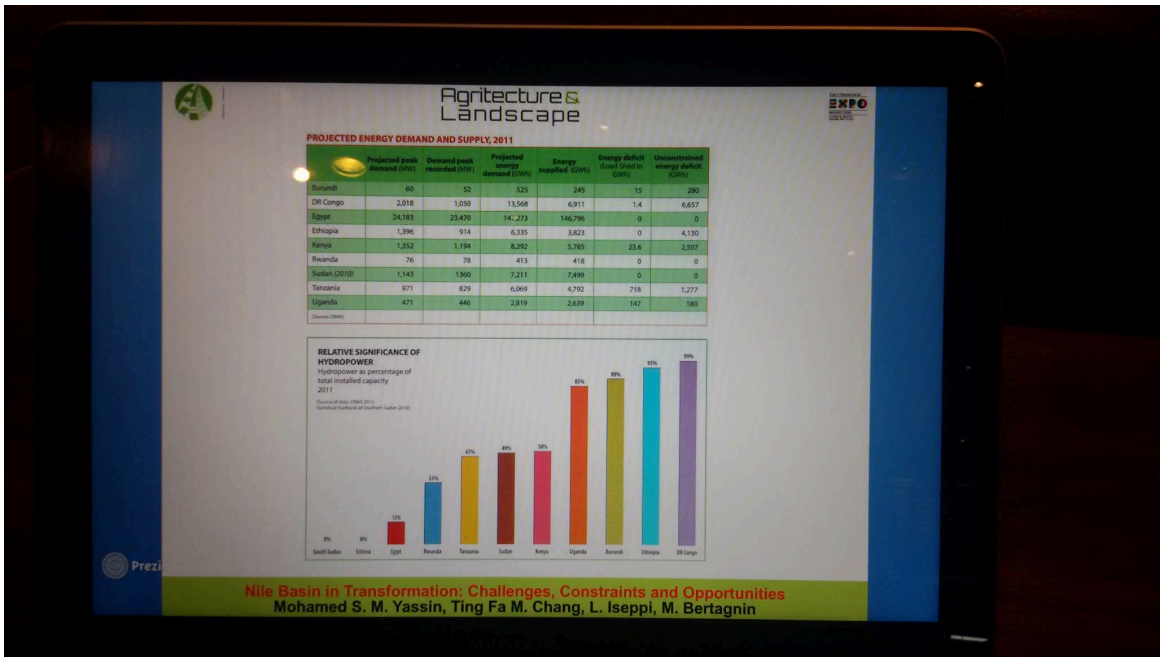


Figure 21. **Production of major cash and food crops of the Nile Basin Riparian States**

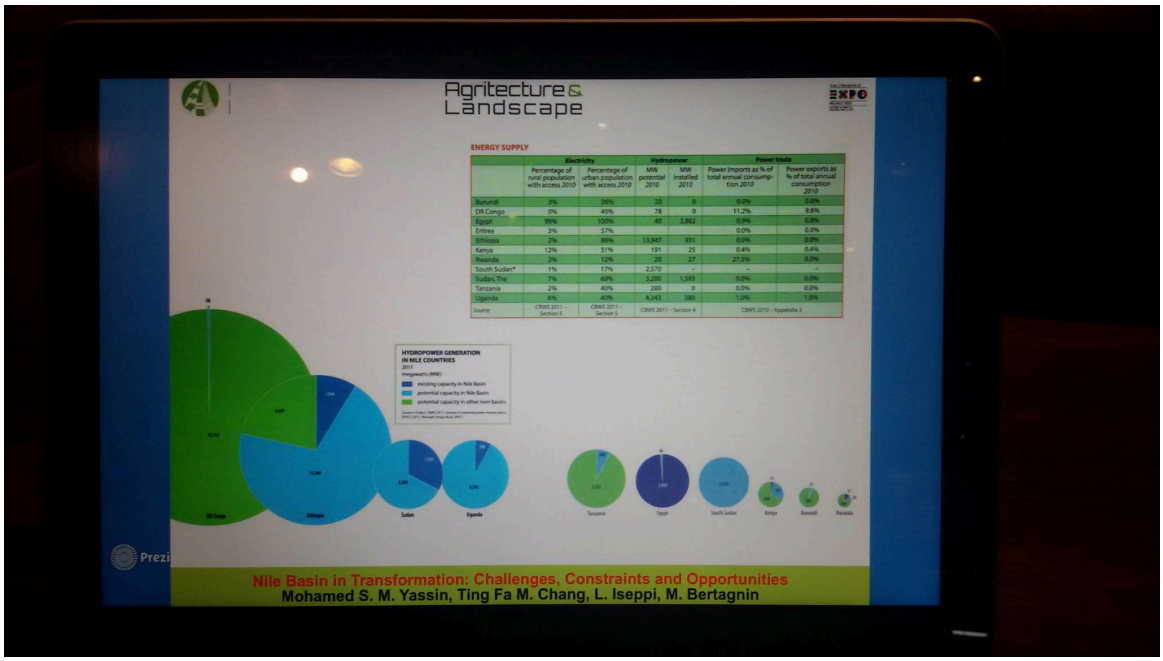


Figure 22. **Production of major cash and food crops of the Nile Basin Riparian States**

Figure 23. **Production of major cash and food crops of the Nile Basin Riparian States**

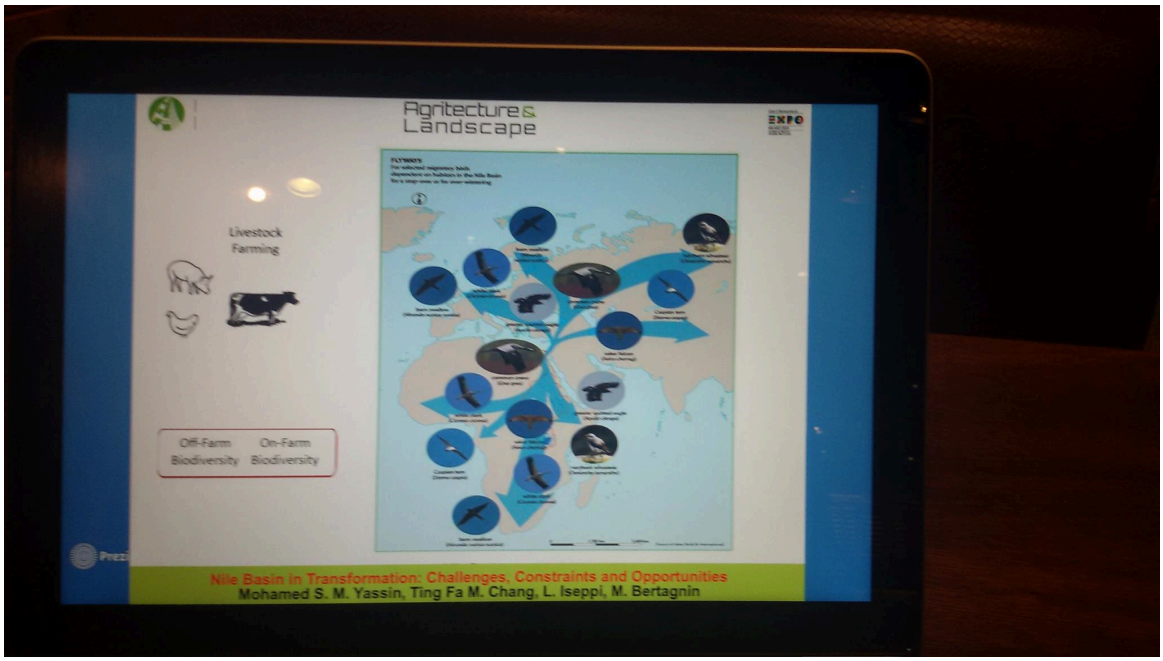


Figure 24. **Production of major cash and food crops of the Nile Basin Riparian States**

Chapter 3: Human Rights in the Nile Basin: Between Sustainable Development and the Human Right to the Nile

3.1 Abstract and key words:

The Nile River is a geographically, historically, socio-economically, environmentally, politically, culturally, hydro-logically, climatically, demographically and naturally shared river of transboundary dimensions within the current composing states. The Nile Basin constituted and continues to sustain and be the major driver of the development and stability for its inhabitants, as it has been an umbilical cord, backbone and the cradle of ancient and prosperous civilizations. The Nile basin is composed of eleven different states or countries namely; Burundi, DR Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, The Sudan, Tanzania and Uganda, which composes landscape realities of diverse developmental status, with prospects of political economy, constitutional structure, juridical systems, governance systems, physical nature and situations of human rights aspects. The resources allocation and exploitations within the Nile Basin have led to the formations of heterogeneous developmental territories and states. The last decades witnessed the race to reach the universally established Millennium Development Goals (MDGs), which are strongly and imperatively needed for the populations of the Nile Basin. Despite the partial achievements of the MDGs, the newly set Sustainable Development Goals (SDGs) remain a hard task. As development is needed for peace and peace is need for development, neither peace nor development could be attained without respect of the fundamental human rights.

This article focuses on, the "Right to the Nile" an issue that is gaining momentum as the apparently conflictive relationship between the growing populations, economies and improvement of developmental prospective and nature conservation. The Nile Basin's complex challenges and potential opportunities should be tackled by (and not only) the strategic planners and policy-and-decision-makers together with the democratic leadership in an accurate and deep long-term planning and comprehensive vision to guide the upcoming transformative process and to capture the opportunity to attain the SDGs. This article is an attempt to shed a more comprehensive light and foresights on some critical issues in the Nile Basin associated with the right to development and right to the Nile. The thesis in this article is sustaining that the Nile Basin is mainly but not merely water. Furthermore, it is calling for attributing due importance and value to the distinguished single and collective tangible and

intangible resources of the land, water, climate, biodiversity, fauna, flora, and humans inhibiting that ecologies and forming the Nilotic diverse territories who deserve to live in enabling environment assuring dignity, respected human rights, sustainable development and prosperity.

This part of the working and discussion paper in this chapter chapter is intended to discuss and debate the human rights perspective and prospects in the Nile Basin, focusing and inter-relating the human rights to the the right to achieve participatory sustainable development and governance of the River Nile Basin, assuring stability, peace and secrurity and equitable right to the Nile through decomractic policy-and-decision-making for conflict mitigation.

Keywords: Nile Basin, Universal Human Rights, Millennium and Sustainable Development Goals, Right to Development, Right to the Nile.

3.2 Introduction

The River Nile is 6.695 km length covering a basin area of 3.176.543 squared km as in the Nile Basin Initiative reports (state of the River Nile 2012, Nile Basin Inititaitive (NBI), page 12) and this constitutes almost 10% of the African superfice, while Bowden Rob stated that the Nile River is the longest River in the world with total river length as 6.670 Km (Bowden Rob, A River Journey, 2006). There are multiple sources originating from different riparian states forming the Nile Basin. Ripon Fall may be the starting-point of the Nile, but any streams that flow into Lake Victoria (the indigenous name is Nyanza) could claim to be the true source. Streams tumble down from a chain of mountains that cross central Africa and surround much of Lake Victoria, the Kagera River and its tributary the Ruvubu with its headwaters in Burundi are now considered the true source of the Nile (Bowden Rob, A River Journey, 2006); (Bowden Rob, Settlement of the River Nile, 2005). It is from here that the Nile is measured as the world's longest river (Bowden Rob, A River Journey, 2006); (Bowden Rob, Settlement of the River Nile, 2005). The same Bowden Rob in his book settlements of the River Nile mentioned that the majestic River Nile is the longest river in the world and it stretches for an incredible 6.650 Km (Bowden Rob, A River Journey, 2006); (Bowden Rob, Settlement of the River Nile, 2005).. The Nile basin is composed of eleven different countries namely; Burundi, DR Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania and Uganda. The Nile Basin communities are graced with huge endowments and paradoxically suffer poverty, food and nutrition insecurity despite

these endowments. The efficient and effective use, management and investments in the resources of the Nile Basin is a major and complex challenge for the economic, social, environmental, ecological, political and cultural growth and development for the people and communities inhibiting the Nile Basin region. It is vital for the peaceful coexistence of the growing population almost approaching 41% of the population of the African continent and the growing percentage projected to reach 10 % of the world population will be living in Nile Basin region (United Nations, Department of Economic and Social Affairs, World Urbanization Prospects (2012). This percentage of Nile Basin population were only 3% during the decade of their independence, jumped to 5% the time when the Millennium Development Goals (MDGs) were set, reached 6% when the Sustainable Development Goals (SDGs) are formulated and projected to be 8% by the deadline year of the 2030 Agenda of the Sustainable Development Goals) (United Nations, Department of Economic and Social Affairs, World Urbanization Prospects (2012). Thus the development plans should neglect this fact and policy-and-decision-makers cannot trample over the Nile Basin people right to development.

3.3 Demographic Structure of the Nile Basin Countries (NBCs) and the Gross Domestic Product (GDP) per capita:

Since the 1950's the Nile Basin countries and communities have shown huge demographic dynamics, growth and continue to leap as shown in table 2.

Major area, region, country or area	1950	2000	2015	2030	2050
World	2,532,229	6,122,770	7,284,296	8,321,380	9,306,128
Sub-Saharan Africa	179,766	641,566	929,939	1,303,018	1,891,711
Africa	229,895	811,101	1,145,316	1,562,047	2,191,599
Eastern Africa	67,611	258,215	380,760	542,799	802,184
Burundi	2,456	6,374	9,231	11,441	13,703
Eritrea	1,141	3,668	6,077	8,394	11,568
Ethiopia	18,434	65,578	92,000	118,515	145,187
Kenya	6,077	31,254	46,332	65,928	96,887
Rwanda	2,072	8,098	12,295	17,579	26,003
South Sudan	2,854	6,631	11,654	16,102	22,571
Uganda	5,158	24,213	39,113	59,846	94,259
United Republic of Tanzania	7,650	34,038	52,311	81,852	138,312
Middle Africa	26,116	96,187	143,631	200,021	278,350
Democratic Republic of Congo	12,184	49,626	75,190	105,956	148,523

Northern Africa	50,129	169,535	215,377	259,029	299,888
Egypt	21,514	67,648	88,179	106,498	123,452
Sudan	6,336	27,556	37,418	50,755	68,391
Southern Africa	15,588	51,442	59,585	64,126	67,327
Western Africa	70,451	235,722	345,963	496,071	743,850
Asia	1,403,389	3,719,044	4,375,482	4,867,741	5,142,220
Europe	547,287	726,777	742,067	741,233	719,257
Latin America and the Caribbean	167,368	521,429	622,437	701,606	750,956
Northern America	171,615	313,289	359,638	401,657	446,862
Oceania	12,675	31,130	39,355	47,096	55,233
Nile Basin Countries (NBCs)	**85,876**	**324,685**	**469,799**	**642,867**	**888,856**
Nile Basin Countries % of Africa Population	**37%**	**40%**	**41%**	**41%**	**41%**
Nile Basin Countries % of World Population	**3%**	**5%**	**6%**	**8%**	**10%**

Table 2. The Nile Basin population compared to the African and World Population (1,000 Inhibtants).

Source: Author elaboration and extractions from the United Nations, Department of Economic and Social Affairs, Population Division. (2012). World Urbanization Prospects: The 2011 Revision, CD-ROM Edition.

In the 1950's Egypt and Sudan stipulated their 1959 Agreement to share the Nile water aiming at boosting their development when their total population was oscillating around 30 million and the period when the Nile Basin Initiative started the discussion and dialogue about the Cooperation Framework Agreement (CFA) the population of Egypt and Sudan jointly counted around 100 million inhabitants in the mean time the rest of the Nile Basin countries and communities have shown huge demographic leaps. For wise developmental policies setting it is worth to consider that the total Nile Basin population including Egypt and Sudan were around 85 million in 1950 and leaped to around 470 million in 2015 and continues to grow at a considerable rates and pace (table 2). Therefore, a per capita share of save and drinkable water should be reconsidered and continuously updated, and revised. And thus, appropriate, equitable and sustainable policies towards the achievement of sustainable development is imperative through wise uses of the available and potential resources, sustainable management of the lands, water, biodiversity, climate, and above all the human capital, in addition to a transparent and mutually fair and responsible investments and partnerships for the mutual benefits and prosperity of all the Nile Basin communities.

In the 33rd session of the United Nations Human Rights Council (UN HRC33), a side

event was jointly organized by the International Lawyers Organization and the *collectif de femmes pour les droits de l'homme* on the 27th September 2016 in room xxiv at the *palais des nations* and the one and half hours were dedicated to discuss the question "The Greater Ethiopian Renaissance Dam (GERD) impedes the Right to Water? And the author thinks that was posed in the framework of the right to safe drinkable water and sanitation. It seems that the GERD *per se* is not the real motivation to be adopted by the UN HRC33 but the global right to access to safe drinkable water and sanitation is the stake. To bring informative notions about this event, the author poses the summary of the session to let allow better understanding of the whereabouts of this mobilization. The organizers summarized the session and basically three speakers were programmed to intervene to tackle this complex question. The panellists included Dr. Asfaw Beyene, Dr. Ahmed el Mofty (written intervention) and Mr. Mostafa Ashour. In the summary, it is written that the construction of the Dam, which started in April 2011, raises issues about threats to the human right to water of individuals who depend on the Nile waters for their livelihood. The three experts discussed the problem from the legal, political and technical perspectives respectively, while acknowledging that the Right to Water as a basic human right must be safeguarded throughout the project by all riparian states and stressing on the need to find a mechanism for cooperation in time among the Nile basin countries. Dr. Asfaw expressed his concerns during the event by highlighting 6 controversies of the project. First of all, the electricity production target of GERD would not be reached as it is predicted for now, which means that the economic value of the dam is overestimated. Furthermore, he discussed about the length of the filling period and the associating risks when the timing is not managed properly. One of the six concerns Dr. Beyene introduced was focusing on the risk factors and dam failures, which the speaker claimed are inherent to such large projects as they happen at a rate of more than two per year. Thus, large dams may not only introduce changes to micro-climate, but also carry structural risks which should be monitored steadily. Dr. Mofty approached the issue from a legal perspective. He affirmed that the Right to Water as a fundamental human right must be respected at all times and for all people and it is manifested in UN Resolution and various international treaties. He is concerned that the construction of the Dam (GERD) would breach the international law and endanger the current regional peace and security. Mr. Ashour addressed the political significance of the GERD project and acknowledged that it is of great importance for the countries to cooperate in good faith in order to avoid possible disastrous outcomes and realize the regional prosperity for all. On this note of cooperation, the side event was concluded and

followed by an interactive questions and comments session with the audience raising concerns from different angles, which deepened the discussion in a relatively constructive manner.

The Author contacted the event organizers and speaker to seek more details and answers. One of the contacted stakeholders, who is a professor in a USA University answered that 'The dam can infringe on the right of water and he wrote (I don't necessarily buy the concept of water right, water is a need of life that shouldn't be degenerated to exercise of political right). It stores water, and it is the extent of the storage and its intensity that is a matter of dispute. It can be stored in a manner it wouldn't impede water rights'. Previously he published that the 1959 Agreement allotted 55.5 and 18.5 billion cubic meters to Egypt and the Sudan, respectively, through the Blue and Atbara Rivers. Ethiopia has limited rights to use these resources. In May 2010, upstream states of the Nile signed a Cooperative Framework Agreement pronouncing the 1959 Agreement no longer valid and claiming rights to more water from the River Nile while Egypt and Sudan refused to sign. Thus, there is no mutually accepted water treaty between upstream and downstream countries. Flourishing irrigation projects and dam constructions in the Sudan and Egypt, while these same countries object the use of Nile by upstream countries, will have little convincing power in Africa and the rest of the world, even if it can't convince Arab countries whose firm solidarity remains with the Sudan (https://www.opride.com/2013/06/14/reflections-on-the-grand-ethiopian-renaissance-dam/)..

Developmentally speaking, all the Nile Basin Countries are vulnerable and need to continue their paths towards securing their people, in terms of food and nutrition, and other developmental fronts. It is clear that the vast majority of the Nile Basin States are currently low-income countries as shown in figure 25.

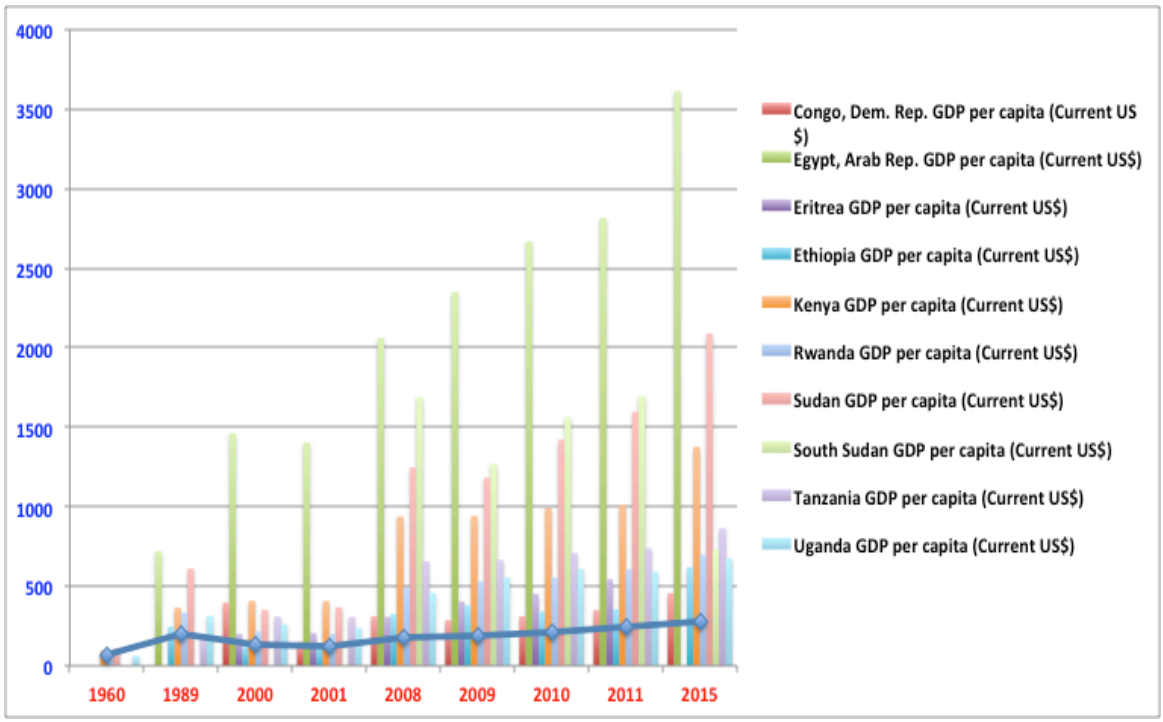


Figure 25. **Graph of The Nile Basin Countries GDP per capita (Current US$).**

Source: Author elaboration and extractions from the World Bank Data: World Development Indicators, Last Updated Date: 10/14/2016. (http://data.worldbank.org/indicator/NY.GDP.PCAP.CD) (http://data.worldbank.org/data-catalog/world-development-indicators)

If we consider the GDP per capita of the member states of the Nile Basin we can notice that the gap between Egypt and relatively South Sudan and Sudan and the rest of the Nile Basin states (Figure 25). Therefore, equitable, reasonable and sustainable allocation of the Nile Basin resources by policy-and-decision-makers and associated stakeholders will avoid morphing of conflicts and assist in constructive transformations in the Nile Basin.

'In 1974 at the height of the energy crisis, a member of the Kenyan Parliament suggested that the Nile be harnessed at Lake Victoria and the water sold for oil, barrel for barrel. Since neither Sudan nor Egypt produced oil at the time, the threat remained nothing more than a bad Joke. With Ethiopia, however, the threat is real' as reported by the late Agricultural Economist Dr. de Mabior in his PhD thesis (de Mabior John Garnag, 1981). The oil producing countries can responsibly invest in water-and-resource-endowed countries fairly, valuing the connected resources necessary for the agro-food, environmental services and animal production from which they are assuring their food and nutrition security. Food and nutrition security is one of the major causes of the complex resource grabbing marathon

as well as the climate change adaptation and mitigation; the energy and water security; the demographic instability, the social and economic needs, the ecological foundation security, and the regional polarization, among others. Resource grabbing is a complexity directly associated with the ownership and foreign direct investments. It is a challenging issue for the international juridical system in terms of transparency, accountability, fight against corruption, money laundering, human rights and national sovereignty, international development cooperation and humanitarian integrity. Doubtless, resource grabbing will lead to non-sustainability in the sense that it deprives the interested population from their fundamental human rights and well being (Yassin *et al* 2013).

3.4 Review, view and vision of the Right to Development under the Nile Basin Developmental Landscape: The Rights to Development and the Nile

As it is mentioned in the Declaration on the Right to Development, adopted by the UN General Assembly in its resolution 41/128 of 4 December 1986, the Vienna Declaration and Programme of Action, which reaffirms the right to development as a universal and inalienable right and an integral part of every human right; UN Human Rights Council resolutions 4/4 of 30 March 2007 and 9/3 of 17 September 2008, and recalling all Council and General Assembly resolutions on the right to development, the most recent being Council resolution 30/28 of 2 October 2015 and Assembly resolution 70/155 of 17 December 2015, in addition to all the resolutions of the Commission on Human Rights on the right to development, including resolutions 1998/72 of 22 April 1998 and 2004/7 of 13 April 2004, in support of the implementation of the right to development. The right to development is an added human right to the core human rights reported in the Charter of the United Nations, and particularly in the Nile Basin the right to development could not be considered in segregation from the Right to the Nile.

The right to development is a right to the Nile as it is embedded in the core objectives of the Nile Basin Initiative, which are (i) To develop the Nile Basin water resources in a sustainable and equitable way to ensure prosperity, security, and peace for all its peoples; (ii) To ensure efficient water management and the optimal use of the resources; (iii) To ensure cooperation and joint action between the riparian countries, seeking win-win gains; (iv) To target poverty eradication and promote economic integration; and (v) To ensure that the program results in a move from planning to action (http://www.nilebasin.org/).

All the Nile Basin states have welcomed the adoption of the 2030 Agenda for Sustainable Development emphasizing that the 2030 Agenda is informed by the Declaration on the Right to Development and that the right to development provides a vital enabling environment for the full realization of the Sustainable Development Goals. Furthermore they have recognized that achieving the internationally agreed development goals, including the unmet MDGs and the SDGs, requires effective policy coherence and coordination, and that hunger and extreme poverty, in all its forms and dimensions, are the greatest global challenges and require the collective commitment of the international community for their eradication, and therefore calling upon the international community to contribute to the achievement of that goal, in accordance with the SDGs, and emphasized that all human rights and fundamental freedoms, including the right to development, are universal, indivisible, interdependent and interrelated, and underlined that the successful implementation of the Sustainable Development Goals will require the strengthening of a new, more equitable and sustainable national and international order, as well as the promotion and protection of all human rights and fundamental freedoms.

In fact, the Right to development is a commitment declared by a number of United Nations specialized agencies, funds and programmes and other international organizations to make the right to development a reality for all, and in this regard urging all relevant bodies of the United Nations system and other international organizations such as the Nile Basin Initiative to mainstream the right to development into their objectives, plans, policies, programmes and operational and financial activities, in particular into development and development-related processes, including the follow-up to the Fourth United Nations Conference on the Least Developed Countries, stressing the primary responsibility of States for the creation of national and international conditions favourable to the realization of the right to development, and recognizing that Member States of the United Nations, Nile Basin states included, should cooperate with each other in ensuring development and eliminating lasting obstacles to development, that the international community should promote effective international cooperation, in particular global partnerships for development, for the realization of the right to development and the elimination of all the obstacles to development, and that lasting progress towards the implementation of the right to development requires effective and efficient development policies at the national level, as well as equitable economic relations and a favourable economic environment at the international level.

For that purpose all Member States of the United Nations and Nile Basin states in particular are encouraged to engage constructively in the discussions for the full implementation of the Declaration on the Right to Development with a view to overcoming the existing political impasses within the working groups on the Right to Development, thus affirming that aftermath of the thirtieth anniversary of the Declaration on the Right to Development presents a unique opportunity for the international community to demonstrate and reiterate its unequivocal commitment to the right to development, recognizing the high profile it deserves, and redoubling, if not more, its efforts to implement this right.

To frame argumentation that the right to development is within the right the to the Nile, or in simple phrase that "The right to the Nile is a fundamental universal human right", a possible justification for this argument is that the Nile is the major stake behind the development and prosperity of passed, living and coming civilizations for all its riparian states. It is an imperative right of current and future generation to find sound, healthy and sustainable Nile Basin. As it a primary responsibility of the Nile Basin states and community to promote and protect civil, political, economic, social and cultural rights, and all the human rights including the right to development and naturally the Right to the Nile is integrative part of all these rights. The right to development is an added human right to the core human rights reported in the Charter of the United Nations, and particularly in the Nile Basin the right to development could not be considered in segregation from the Right to the Nile.

The UN General Assembly on 25 September 2015 adopted the 2030 Agenda for Sustainable Development, aiming at including all and without leaving anyone behind and the Nile Basin is part of this ongoing process. However, the Sustainable Development Goals (SDGs) remain a hard task to and for all the Nile Basin riparian states, governments, civil society, international community, development organizations, global institutions and above all the very populated Nile Basin communities.

Therefore, the Nile Basin states should emphasize the urgent need to make the right to development as a reality for everyone, and that all human rights and fundamental freedoms, including the right to development, can only be enjoyed in an inclusive and collaborative framework, at the international, regional and national levels, and in this regard underlining the importance of engaging the United Nations system, including United Nations specialized agencies, funds and programmes, within their respective mandates, relevant international organizations, including financial and trade organizations, and relevant stakeholders, including civil society organizations, development practitioners, human rights experts,

academia, private sector and the public at all levels, in discussions on the right to development in the Nile Basin.

Under this prospective, the Nile Basin community and the collectively the constituting Nile Basin riparian states, being integral and inseparable part of the International Community should be stressing that the responsibility for managing worldwide economic and social issues and threats to international peace and security must be shared among the nations of the world and should be exercised multilaterally, and that, in this regard, the central role must be played by a Nile Basin Commission and the United Nations as the most universal and representative organization in the world.

The Nile Basin states, should work seriously on the institution-building the of the Nile Basin Community and transform the Nile Basin Initiative and the annexed or related civil society organizations and partners into a Nile Basin Commission with clear mandate to enhance and sustain the development and fully engage in the 2030 Agenda of the sustainable development goals (SDGs). To implement this mandate a series of prioritized operational steps should be designed and well planned. Surely that is achievable endorsing genuine cooperation spirit in coordination with inter-and-intra-agencies within the United Nations system in conjunction with the Nile Basin Institutions that have direct relevance to the realization of the right to development, providing analyses of SDGs implementation, taking into account the existing challenges, constraints and making recommendations on how to overcome them and capture the potential common opportunities endowed by the Nile Basin as territorial capital. Operationally and practically ad hoc commissions and working groups could be formed to follow up the implementation of the Declaration on the Right to Development, to take sufficient measures to ensure balanced and visible allocation of resources and due attention to ensure the visibility of the right to development by identifying and implementing tangible projects dedicated to the right to development, and to provide regular updates to the concerned stakeholders and local communities in this regard.

It will be essential to recognize the need for renewed efforts towards intensifying deliberations in the inspired implementing commission, (eventually the Nile Basin Commission or Sub-basin Commissions), and working groups to fulfil, at the earliest, its developmental mandate as established. Furthermore, acknowledge the need to strive for greater acceptance, operationalization and realization of the right to development at the international level while urging all Nile Basin riparian States to undertake at the national level the necessary policy formulation and to institute the measures required for the implementation

of the right to development and the attainment of the SDGs as an integral part of all human rights and fundamental freedoms.

The Nile Basin community has unique opportunities to celebrate and commemorate, mainstream the Declaration on the Right to Development, and its inclusion into human rights, in conjunction with the adoption of "The 2030 Agenda for Sustainable Development and human rights, with an emphasis on the right to development", which provides a unique opportunity to international community and Nile Basin member states to demonstrate and reiterate their political commitment, accord the right to development the great attention it deserves and to redouble or augment their efforts towards the realization of the right to development, set standards for the implementation of the right to development as useful basis for further deliberations on the implementation and realization of the right to development. They should advance considering criteria and operational sub-criteria with a view to finalizing texts and/or elaborations and formulations concerning the progressive implementation, reporting and follow-up of the 2030 SDGs agenda normally prepare-able in the international community *fora*. They should facilitate active participation of experts from the Nile Basin community, provide advice with a view to contributing to discussions on the implementation and realization of the right to development, including the implications of the 2030 Agenda for Sustainable Development, and looks forward to the possible engagement of the formed working groups with high-level socio-political forum.

Surely, the decision is for the Nile Basin states to continue to act to ensure that its agenda 2030 promotes and advances sustainable development and the achievement of the remaining and unmet Millennium Development Goals and the Sustainable Development Goals and, in this regard, lead to raising the right to development in the framework of the human rights and fundamental freedoms. It remains for the Nile Basin community to endorse and provide recommendations of the Human Rights Council to finalize consideration of the criteria and operational sub-criteria in relation to the elaboration of a comprehensive and coherent set of standards for the implementation of the right to development, and also take appropriate steps to ensure respect for the practical application of these standards, which could take various forms, including guidelines on the implementation of the right to development, and evolve into a basis for consideration of an innovative international legal standard of a binding nature, through a collaborative process of engagement.

It will be imperative for the Nile Basin community to contribute to the promotion, protection and fulfilment of the right to development in the context of the coherent and

integrated implementation of the 2030 Agenda for Sustainable Development and other internationally agreed outcomes of 2015, including the Sendai Framework for Disaster Risk Reduction, the Addis Ababa Action Agenda of the Third International Conference on Financing for Development and the Paris Agreement on Climate Change, and to this effect, engage with member states of the international community and other stakeholders and participate in relevant international meetings and conferences. Additionally, engage and support efforts to mainstream the right to development among various United Nations bodies, development agencies, international development, financial and trade institutions, and to submit proposals aimed at strengthening the revitalized global partnership for sustainable development from the perspective of the right to development among the Nile Basin states.

Furthermore, the Nile Basin Community should encourage relevant bodies of the United Nations system, within their respective mandates, including United Nations specialized agencies, funds and programmes, relevant international organizations, and relevant stakeholders, including civil society organizations, to give due consideration to the right to development in the implementation of the 2030 Agenda for Sustainable Development, and to contribute further to the work of the already working groups and to cooperate with the High Commissioner and the Special Rapporteur in the fulfilment of their mandates with regard to the implementation of the right to development.

The Nile Basin Community can learn from the experiences of the shared resources communities such as the European Union (EU) which has reiterated its support for the Right to Development, as based on the indivisibility and interdependence of all human rights, the multidimensional nature of development strategies and the individuals as the central subjects of the development process. As stated by the EU, the Right to Development requires the full realisation of civil and political rights together with the economic, social and cultural rights and requires a mix of policies, creating an enabling environment for individuals, involving a wide range of actors, at different levels. Highlighting the importance of a rights-based approach to development, encompassing all human rights including the Right to Development, and emphasising that the primary responsibility for ensuring that the right to development is realised and owed by States to their citizens. The Nile Basin community can be operational in recognition of the right to development and advancing the implementation of the SDGs 2030 agenda, in consensus, avoiding duplications and in harmonization with other national and regional and continental mechanisms and agenda, such as the 2063 African Union (AU) Agenda.

To score significant and tangible achievements in the SDGs, the Nile Basin community must augment its ownership of the developmental and prosperity paths and intensify its efforts to recruit indigenous and external teams with adequate qualifications, relevant experience, expertise, independence, impartiality, personal integrity, objectivity, availability and motivation in compliance with relevant provisions of Human Rights mandatory institutions and have its tailored and innovative ones, providing inputs for the preparations of thematic studies/reports; assisting in policy dialogues on the implementation of the 2030 Agenda on Sustainable Development Goals and to advise the Nile Basin States, intergovernmental organizations such as the Nile Basin Initiative, civil society such as the Nile Basin Discourse, among others, and the local communities and other stakeholders on the effective respect, protection and fulfilment of human rights of those impacted by the implementation of the 2030 Agenda for Sustainable Development, and to undertake thematic research on the effective implementation of SDGs and its particular focus on the targets. Therefore, providing inputs for the preparations of thematic studies/reports; assisting in policy dialogues on the implementation of the 2030 Agenda on Sustainable Development Goals and providing substantive assistance in the development of questionnaires and conduct e-consultations and field-research for data collection with a view to gather, request, receive and exchange information and communications from and with all relevant sources, including the Nile Basin States, their representative organizations and any other parties, relating to effective measures to ensure respect, protection and fulfilment of human rights of those impacted by the implementations of the SDGs agenda to prepare recommendations under guidance of the competent institutions and bodies. Surely, as a Nile Basin Community there will be divergent views in the understanding of the Right to Development, therefore, convergence, consensus and trust building and reconciliations are imperative for reaching a democratically and deliberatively common position through really genuine dialogue and mobilization. Taking into consideration the fundamental differences on issues such as the role of the conventional developmental indicators, the content of the Right to Development, its implications as well as appropriate instruments to realize the inspired development in the framework of the SDGs and the Right to the Nile is crucial in this orientation towards common prosperity. That should be done avoiding duplication of the already existing mechanisms, creating more coordination, synergy, and collective harmony without dissipation of energies and resources.

The Nile Basin prospective to the human rights should continues to update and encompass the right to the adequate housing as a component of the right to an adequate

standard of living; the right to non-discrimination; the right to land; the right to peace and stability; the right to non-displacement; the right to clean water and sanitation; the right to participate in culture; the right to food; the right to work and receive education; the right to the protection of the cultural heritage; the right of the indigenous peoples; the rights of the peasants; and right to the protection from the hazardous waste; the right to preventing maternal mortality and morbidity; the rights of the older persons; the right to the transitional justice; all the substantive rights to life, to fair trail, and freedom from torture, from fear, from slavery jointly taken with the basic and fundamental rights to self-determination, liberty, due process of law, freedom of movement, of thought, of religion, of expression, of assembly, and of association; freedom to enjoy the fruits of responsible investments in the indigenous resources, freedom to enjoy the outcomes of the scientific research. In addition to all bills of the rights recently discussed and endorsed in the resolutions of the United Nation Human Rights Council, which considers that all people are entitled to regardless of nationality, sex, national or ethnic origin, race, religion, language or other status. Naturally bearing in mind and heart the Universal Declaration of Human Rights (UDHR) (http://www.ohchr.org/EN/UDHR/Pages/UDHRIndex.aspx), which is the foundation of the international system of protection for human rights adopted by the United Nations General Assembly on December 10th, 1948 and consists of 30 articles which establish the civil, political, economic, social, and cultural rights of all people with a vision for human dignity that transcends political boundaries and authority, committing governments to uphold the fundamental rights of every and each person.

3.5 The Millennium Development Goals (MDGs), The Sustainable Development Goals (SDGs) and the Nile Basin

The MDGs (Table 3) were believed to form a blueprint agreed to by all the world's countries and all the world's leading development institutions as they have galvanized unprecedented efforts to meet the needs of the world's poorest as mentioned by the UN (http://www.un.org/millenniumgoals/). The MDGs were ranging from halving extreme poverty rates to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015. These MDGs were described as S.M.A.R.T, i.e. Simple, Measurable, Actionable, Reachable and Time-bounded. Despite all that, much was unmet, especially by the 10 Nile Basin States (before the independence of the Republic of South Sudan, the 11th Nile Basin States community member) and the newly independent republic of

South Sudan and being a new 11th Nile Basin States community member.

MDGs	SDGs
Goal 1: Eradicate extreme poverty and hunger	Goal 1. End poverty in all its forms everywhere
Goal 2: Achieve universal primary education	Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3: Promote gender equality and empower women	Goal 3. Ensure healthy lives and promote well-being for all at all ages
Goal 4: Reduce child mortality	Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5: Improve maternal health	Goal 5. Achieve gender equality and empower all women and girls
Goal 6: Combat HIV/AIDS, malaria and other disease	Goal 6. Ensure availability and sustainable management of water and sanitation for all
Goal 7: Ensure environmental sustainability	Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8: Develop a global partnership for development	Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
	Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
	Goal 10. Reduce inequality within and among countries
	Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
	Goal 12. Ensure sustainable consumption and production patterns
	Goal 13. Take urgent action to combat climate change and its impacts
	Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
	Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
	Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
	Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Table 3: The United Nations Millennium and Sustainable Development Goals:

Important blame on the failure to achieve the MDGs is shouldered to the global crises and conflicts active in the Nile Basin States, and the lack of development finance either from the very Basin States and/or the International Community, however, those challenges were though about and dealt with in the Addis Ababa Agenda for financing development in 2015, and the Nile Basin have to exert their best efforts to catch up with the developmental or develop{mental} gap accumulated.

The developmental pendulum in the Nile Basin swings back and forth between the countries of the sources of the Nile and the countries of destination in the Nubia often referred to as upstream and downstream countries; nonetheless, it swings left and right between the Blue and White tributaries. This natural swinging and interplay is influenced by todays' interconnected and interdependent multi-polar international and multiregional systems. This dynamism should encourage the Nile Basin countries to accelerate their efforts to form the Nile Basin Commission and move towards lifting the Nile Basin communities from poverty, conflicts, mistrust and political apathy. All the Nile Basin communities are in urgent need for sustainable development, peace, and appropriate governance, and when we investigate the developmental status of every and each single Nile Basin State digging in its reality of agriculture and rural development, urban development, economy and growth, education, energy and mining, environment, health, gender, infrastructure, science and technology, social

development, trade, labour and employment, private sector, public sector, external debts, aid effectiveness and thus picturing the status of the primary sector (Agri-food), the secondary sector (Industry and manufacturing) and the third sector (Services) of the Nile Basin economies and industrialization, we can realize that these people deserve and merit to be assured to all the rights of development and the Right to benefit from the Nile.

The SDGs are composed of 17 goals (table 3) (http://www.un.org/millenniumgoals/) and its related targets as reported in the Resolution A/RES/70/1 entitled Transforming our world: the 2030 Agenda for Sustainable Development, which is adopted by the UN General Assembly on 25 September 2015 (http://www.un.org/millenniumgoals/). While the MDGs, which were unmet or partially achieved, were only 8 goals with similar specific and related targets. The time frame for MDGs was from 2000 to 2015, while the current SDGs time frame is from 2015 to 2030. While, the spatial scale is global and inclusive.

The SDGs considers our world, dignity and future as one and it is enshrined around five Ps: People, Planet, Prosperity, Peace and Partnership. On the People it is focused on the inequality, gender and it inspires to leave no-one behind; On the Planet it deals with the climate change, the circular economy trying to sustain and promote sustainable consumption and production and pay particular attention to the water-energy-food nexus; On the Prosperity it considers inclusive sustainable and resilient cities, aims to promote science, technology and innovation (STI), and enhances trade, growth and related sustainable development; On the Peace front it tries to engage and work with fragile states, addresses issue and deals with migration and refugees and maintain and promote inclusive and peaceful societies; and lastly on the Partnership the SDGs operates and build on the means of implementation, engaging the private sector while ensuring appropriate accountability, follow-up and review.

The Nile Basin community has unique opportunities to celebrate and commemorate, mainstream the Declaration on the Right to Development, and its inclusion into human rights, in conjunction with the adoption of "The 2030 Agenda for Sustainable Development and human rights. Providing a unique opportunity to international community and Nile Basin member states to demonstrate and reiterate their political commitment and to promote and advance sustainable development and to achieve the remaining and unmet MDGs as well as the SDGs.

Coordination is needed when we see the striking example of duplication, fragmentation and overlapping can be felt from the regional environmental governance

frameworks to tackle the climate change challenges. In this regard there are governance frameworks of the Nile Basin Initiative (NBI), East African Community (EAC), Lake Victoria Basin Commission (LVBC), and the Intergovernmental Authority on Development (IGAD) (state of the River Nile 2012, Nile Basin Inititaitive (NBI), page 90-91).

3.6 Enabling Transformative Environment for Community Prosperity for the Nile Basin Community

As it is a primary responsibility of the Nile Basin states and community to promote and protect civil, political, economic, social and cultural rights, and all the human rights including the right to development and naturally the Right to the Nile is integrative part of all these rights.

Bearing a vision of putting in place an enabling transformative environment (Figure 26) in heart and mind, policy-and-decision makers can put on their tables of discussions and their venues of implementation on the practical grounds, effective and efficient policy options and scenarios for tackling the multiplicity and complexity of challenges, constraints and opportunities prevailing in the Nile Basin avoiding the contentious and historic problems hindering the growth and prosperity for the community of the Nile. Such visioning requires analytical and critical thinking and abstract orientation of policy-and-decision-makers in comprehensive patterns.

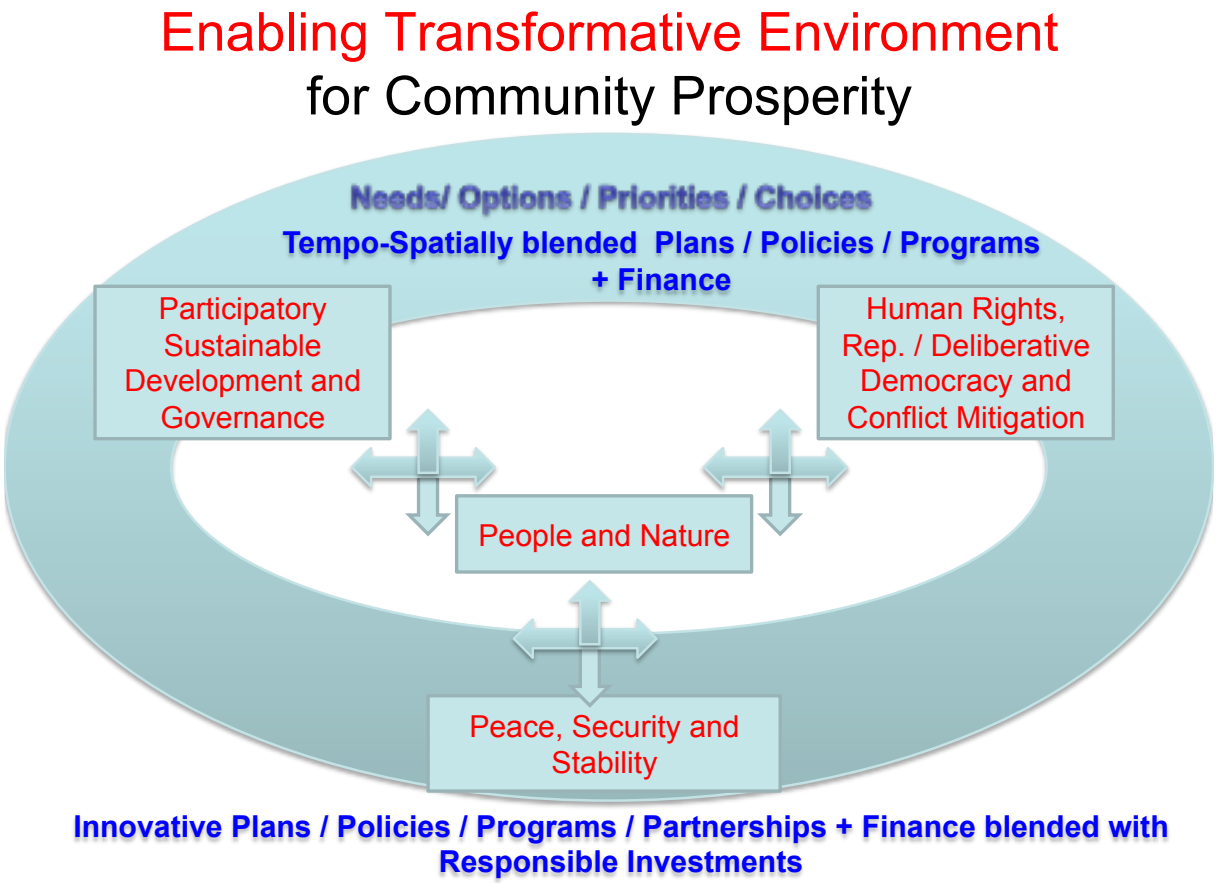


Figure 26. **Enabling Transformative Environment for Community Prosperity.**

To respond to the needs of the Nile Basin Communities, considering their priorities, providing them with options and spectrum of choices, innovative financing mechanism blended with responsible investment strategies should be adapted and adopted. Given and considering these noble objectives, an appropriate governance of the Nile Basin territories requires new and innovative legal frameworks, stemming from founded sound researches, evidences and scientific argumentations. A participated governance system built on consensus on shared visions, which should recognize the right to development for all without exclusions and undermining the basic rights for the indigenous people of the Nile Basin region. No single state from the Nile Basin can claim the inheritance of the Nile or a solo heaven blessing or gift. The Nile is a human heritage and that encompass all the humanity as inseparable part of the planet earth heritage. Consequently, no single Nile territory or neighbourhood territory can grab or takes the "lion's share" of its tangible or intangible resources leaving deprived the others. The Nile is a common wealth for its people and could not be put into frame of opportunistic behaviour of predators and counter forces. Benefiting from the Nile and

benefiting the Nile is a universal right and that thesis or affirmation could be called the "The Right to Nile" and could be acclaimed for consideration among the universally agreed upon human rights.

3.7 Some recommendations and possible actions for the Nile Basin States for creation of enabling transformative environment for prosperity:

The Nile Basin states, could be recommended and advised to work and collectively act seriously on

- Institution-Building:

  The formation of the **Nile Basin Commission** with clear mandate to enhance and sustain the development and the full engagement in the (SDGs) 2030 Agenda, to implement this mandate a series of prioritized operational steps should be designed and well planned

- Genuine cooperation spirit

  Coordination with inter-and-intra-agencies within the United Nations system in conjunction with the Nile Basin Institutions to enhance the realization of the right to development, providing analyses of SDGs implementation, taking into account the existing challenges, constraints and making recommendations on how to overcome them and capture the potential common opportunities endowed by the Nile Basin as territorial capital. Operationally and practically ad hoc commissions and working groups could be formed to follow up.

- Trust building and reconciliations through really genuine dialogue and mobilization, taking into consideration the fundamental differences on issues such as the role of the conventional developmental indicators, the content of the Right to Development, its implications as well as appropriate instruments to realize the inspired development in the framework of the SDGs. Harnessing more coordination, synergy, and collective harmony without dissipation of energies and resources and avoiding duplication of the already existing mechanisms

- Implementation of the Declaration on the Right to Development, to take sufficient measures to ensure balanced and visible allocation of resources and due attention to ensure the visibility of the right to development, and acknowledge the need to strive for greater acceptance at the international level and urging all Nile Basin riparian

States to undertake at the national level the necessary policy formulation and to institute the measures required for the implementation of the right to development and the attainment of the SDGs as an integral part of all human rights and fundamental freedoms.

- Set standards for the implementation of the right to development as useful basis for further deliberations on the implementation and realization of the right to development by advance considering criteria and operational sub-criteria which could take various forms, including finalizing guidelines on the implementation of the right to development, and evolve into a basis for consideration of an innovative international legal standard of a binding nature, through a collaborative process of engagement..
- Identifying and implementing tangible projects dedicated to the right to development, and provide regular updates to the concerned stakeholders and local communities in this regard.
- Recognize the need for renewed efforts towards intensifying deliberations in the inspired implementing commission, (eventually the Nile Basin Commission or Sub-basin Commissions), and working groups to fulfil, at the earliest, its developmental mandate as established.
- Facilitate active participation of experts from the Nile Basin community, provide advice with a view to contributing to discussions on the implementation and realization of the right to development, including the implications of the 2030 Agenda for SDGs, and looks forward to the possible engagement of the formed working groups with high-level socio-political forum.
- Integrate the implementation of the SDGs 2030 Agenda with other internationally agreed outcomes of 2015, including the Sendai Framework for Disaster Risk Reduction, the Addis Ababa Action Agenda of the Third International Conference on Financing for Development and the Paris Agreement on Climate Change and the Nile Basin Shared Vision.
- Learn from the experiences of the shared resources communities such as the European Union (EU) and in harmonization with other national and regional and continental mechanisms and agenda, such as the 2063 African Union (AU) Agenda.
- Augment the ownership of the Nile Basin community by the developmental and prosperity paths and intensify efforts to recruit indigenous and external teams with

adequate qualifications, relevant experience, expertise, independence, impartiality, personal integrity, objectivity, availability and motivation in compliance with relevant provisions of Human Rights mandatory institutions and have its tailored and innovative ones.

- Provide inputs for the preparations of thematic research/ studies/reports; assisting in policy dialogues and conduct e-consultations and field-research for data collection with a view to gather, request, receive and exchange information and communications from and with all relevant sources, including the Nile Basin States, their representative organizations and any other genuine parties from the International community.

3.8 Are there Nile Basin Development Days (NBDDs) as the good example of the European Development Days (EDDs)?

The Nile Day is celebrated by Nile Basin Institutions, like the due celebration of the Human Rights Day, but there are no days dedicated or celebrated as such focusing on the development in the Nile Basin. There is the recent and irregular Nile Basin Development Forum, which reached its 4th edition, which is excellent opportunity but limited to elites and highly specialized stakeholders. For instance, let us consider the European Development Days (EDDs), which is good practice activities dedicate days to debate the development issues and concerns, for this it gathers leaders from around the world and multiplicity of stakeholders. The author is privileged to attend it for different years. From this years session he has reported the following: On the 15th to the 16th of June 2016 in Brussels, the beating heart of the European international development cooperation concluded the 10th Edition of the European Development Days (EDD), a gathering of the International development community focusing on the European desire and motivations to be a leading player in the international development cooperation domain. The EDDs is a very interactive platform in which one can meet, talk, debate, challenge, solve, establish and share links with several key figures and personalities of pioneering roles in the international development and cooperation policies, head of states and assisting teams, executive directors of important global institutions, banks, foundations, academia, INGOs, CSOs, youth leaders, gender advocates, commissioners, artists, media outlets and the list is long to be mentioned all. The 2016 EDD focus was prioritized on the macro-theme of the Sustainable Development Goals in Action: Our World, Our Dignity, Our Future. i.e. The SDGs and its 5Ps (Peace, Prosperity, People,

Planet and Partnership.). This annual gathering has mobilized almost 6.000 concerned persons to Brussels, ranging from the Secretary General of the United Nation Ban Ki-moon, the president of the World Bank Group Jim Yong Kim, invited Presidents of Kenya; Mauritius; Burkina Faso; Central African Republic; Prime Ministers of Ethiopia; Timor-Leste and Samoa; in addition to the European Parliament, Coalition of European NGOs led by CONCORD Europe, Action Aid International, Oxfam and the UNSG advisor on the 2030 Agenda, Voice of Libyan Women, the EU commissioners, the Queen of the Belgians, the Vice-President of European Commission, High Representative of the Union for Foreign Affairs and Security Policy as well as the President of the European Commission and my self as humble academic. Key speakers and moderators articulated and guided the two days event in major sessions, project labs and multi-stakeholders presentations and debates. The EDDs was integrated and enriched by artistic laboratories, photo expo, exhibitions, cultural programs and performances, an EDD global village in addition to two important *fora*, which played a complementary and decorative part of this development summit. The global village was intended to be a crossroads for interaction, innovation and networking central space for showcasing successful projects and groundbreaking reports from around the globe rotating on the 5Ps. The Inclusive Exhibitions featured the Withered Flowers; Goals for Girls Post-2015; Culture Under Attack; 60 Solutions; Freddy Tsimba, and Congo Eza, while the Performances have featured the Dadili; Jumping Village; Shakespeare Hip Hop; François Bamba (Storyteller); Graffiti Art and The Nile Project, a wonderful initiative established by Mina Girgis in 2011 as cross-cultural collaboration between 35 individuals with a view to arousing cultural and environmental curiosity about them with the aim of bridging the cultural gap between river countries, using music as a medium. The EU resilience forum which is series of dialogues between donors, civil society organizations, think tanks, and partners countries aiming at the promotion of concerted practical actions on local risk management and vulnerability reduction to support the seventeen objectives of the 2030 Agenda for Sustainable Development and the World Humanitarian Summit 2016. The debate was ignited on the resilience on the ground especially where there are protracted displacement and chronic vulnerability in fragile settings. Another important forum was the EU-Africa Business forum as a follow-up workshop. This forum was a part of the Joint Africa-EU Strategy (JAES) aiming at discussing the engagement of the private sector in development and mobilization of resources to stimulate growth and contribute to the achievement of the SDGs in Africa and Europe. It was bi-session forum debated the impact of investing in Africa as well as the role

of the public-Private-Partnerships in the Sustainable Energy. Vivid discussions were initiated by the Africa Caribbean and Pacific (ACP) secretariat on the coming revival of EU-African partnership Agreements and its fairness and special debate on the Post-Cotonou Agreement. Strong rejection and concerns were raised over the intended collaboration of the EU with certain African Regimes and the interconnected potential and possible vulnerability to violate basic human rights, *refoulment* of refugees, and diversion of development resources and ODA to address the migration crises. The EDDs was live streamed on social media at the hash tag #EDD16, on twitter @EuropeAid and on the facebook page of Europe Aid as well as the singular media outlets of the diverse participating stakeholders such as the EuroNews and Africa News and my personal invented and innovative social media connections.

The topics discussed, debated and tackled were inaugurated by high level introductory leadership panel on the major theme which is the sustainable development goals in action: our world, our dignity our future; followed by rich sessions on trade, growth and sustainable development; inclusive, sustainable and resilient cities; science, technology and innovation; water-energy-food nexus; circular economy / sustainable consumption and production; climate change; inequalities; gender; leave no-one behind; inclusive and peaceful societies; migration and refugees; working with fragile states; engaging the private sector, means of implementation; EU-Africa business forum follow-up workshop; post-Cotonou debate; ensuring accountability: a shared commitment; EU resilience forum and concluded with a closing high level panel entitled from commitment to action.

Doubtless, the EDD16 is an important milestone following the 8 MDGs era and sailing with the overarching framework flag of the 17 SDGs, this is a key event which has remarked the first global gathering of reflection on the implementation mechanism, follow-up and reporting process. Should our world affirm its noble will to turn the endorsed commitments and transform it into concrete actions and achieved developmental reality, such gatherings should be more frequent at local and global levels engaging everyone, it should engage and involve deep thinkers with critical and analytical capabilities. The SDGs came last year after long debate with tireless efforts and successive summits from Addis Ababa Agenda for Action, to post-MDGs summit at the UN HQ in New York, continuing to COP21 in Paris, these summits were not merely public relations events as some criticize, but were medium and long term planning for our coming 15 years to go. Furthermore, it is happening within the digital revolution and its yielding digital era, which is deepening and widening the understanding of the development dilemma, its linkage with the interconnected, interlinked

and interdependent global security, humanitarian crises and planetarium prosperity and the future we want. The EDDs is integrated part of these global events such as the concluded World Humanitarian Summit in Istanbul and the gatherings in the general assembly of the United Nation.

Basing on his post graduate studies, activism and working with esteemed European Universities and excellence research centres, active dual citizenship, political engagement and representation, the author is privileged to regularly attend the European Development Days since 2010, and gradually be involved and engaged in the successive editions. This allowed him to gain knowledge, share experiences, build enlarged networks, report to those who are left out or those who can't afford to be in, and standing on that he is glad to disseminate for them what he has gained from my active and interactive participation. Personally, he considers the European Development Days as a fantastic, growing, innovative and vivid networking platform, which is keeping the spirit and desires for international inclusive development at the forefront of the international policy. Such wonderful event should be for everyone, everyday and everywhere, especially where development is imperatively and desperately needed. The transition from the smart millennium development goals to the transformative sustainable development goals is a humanity challenge to be addressed by the human collectivity to efficiently and effectively leave-no-one-behind.

3.9 Summary and Conclusive Remarks

The fundamental pillars of development, peace and human right are interdependent and collectively constitutes enabling environment for human prosperity as sketched in figure 26.

The Nile Basin is endowed with immense resources, nature and People who can live collectively in common peace, security, stability and prosperity. Despite its natural and human capital, vast majority of its people miss the ought and merited prosperity, lack the enabling environment which must lead the Nile Basin Communities to the attainment of the sustainable development and compensate for the unmet millennium development goals in participatory and smart fashion, live in and with dilapidated governance systems, suffers from frequent violations and negation of the basic human rights and right to development aggravated by poor representative and deliberative democracies, and under serious vulnerability to preventable conflicts, and risk of missing the chances of development in adequate conservation and reconciliation of its nature and cultural heritage. Often and in many cases

the people in Nile Basin communities lack sustainable peace, security and stability. Thus, the Nile basin Community to satisfy its basic needs and prioritize in its prosperity paths, increase the options and choices for its communities in terms of sustainable development, peace and respect of human rights and dignity, it needs to blend, amalgamate innovative tempo-spatial and financeable plans, programs, policy options and choices, building upon beneficial partnerships and share the available and potential endowments and its umbilical cord and backbone Nile River and source for development. It needs to encourage responsible investments and sustainable allocation and exploitations of its resources. In the Nile Basin Countries, the right to the development cannot be attained without the assuring equitable right to the Nile. Neither peace, security, stability, nor sustainable development and governance can stand without respect of human rights and democracy, all necessary and essential enabling and above all non conflictive environments for the prosperity of the Nile Basin community.

Acknowledgements:

The author would love to acknowledge the helpful support provided by the University of Udine, IPSAPA-ISPALEM, the University of Manchester and Bury Council Libraries for the kind hospitality, the East and Horn of Africa defend defenders of Human rights, the Democracy First Group and Geneva Call for rendering enabling conditions to my team leadership to the 33rd session of the United Nations Human Council 2016 where I gathered, maturated and amalgamated the ideas of this working and discussion paper, and sincere appreciation to my leadership and colleagues in the Committee for Religion Freedom and Citizenship Right of the SPLM-N for nominating and electing me as secretary general of its executive respectively, something made it imperative to dig in the Human Rights huge literature, charter and resolutions. I should also express my gratitude to the anonymous referees for their readiness to provide invaluable comments and advice. Gratitude is extended to Dr. A. Babiker for the read-prove, and to the professors and executives for the constructive, critical comments and advice. Finally, I would like to heartily thank and acknowledge the contributions of the prestigious Sudan Tribune, Sudaneseonline in providing disseminative outlet to my contributions.

Dedication

I dedicate this article to a great maestro, the late Yousif Kowa, who guided us in the Educational track providing visionary readings to complex realities, and to his companion our leader the late Dr. John Garang De Mabior, who wrote his PhD thesis on the Socio-economic Development of Jongeli in the Nile Basin and who guided the addition of the New State to the Nile Basin.

P.S. Note:

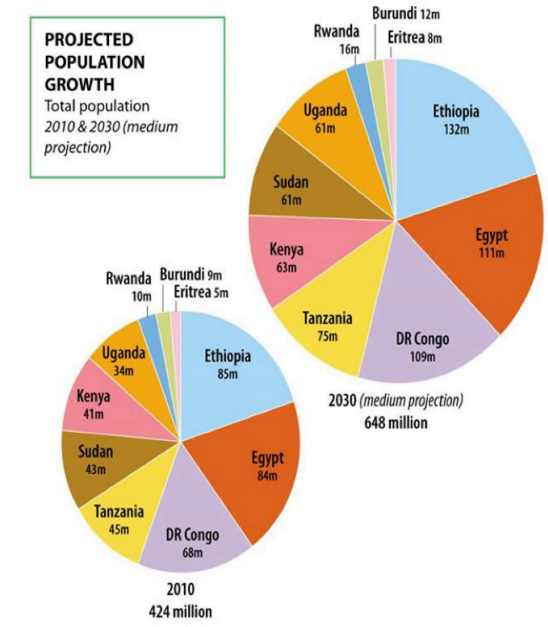
This article is a humble part of the concluding PhD thesis on the Nile Basin in transformation and the

interdependent and interconnected challenges, constraints and opportunities. It is part of the multidisciplinary research program in Economics, Ecology, Landscape and Territory under the coordination of Professor Chang, Supervision of Professor Iseppi and friendly advise of Professor Piccinini. All the views and comments are the sole responsibility of the author.

Chapter 4: Agritecture transforming smallholder Agriculture in Africa: Earthern Underground architecture for a sustainable 2030 Nile Basin vision

4.1 Abstract and keywords:

The Nile Basin now has almost half a billion inhabitants. This number will double within this century as in the United Nations and the Nile Basin estimations and projections, with a huge impact on the environment, the society and the economy at global and local level, especially for the smallholder family farming systems. The Nile Basin ongoing urbanization and architectural patterns are unsustainable following the currently running pathways, which do not reconcile nature conservation while launching sustainable development. Moreover the current development models are too resources consumptive in terms of energy, land, forest, water, biodiversity, fauna and flora and it is not clearly placing the people at the core or heart of these processes. To address such a challenging reality, innovative approaches are needed transcending the boundaries of the current disciplines to anticipate a possible urbanizing population concentrated in limited spaces with limited resources. The emerging discipline of *agritecture* (acronym of agriculture and architecture) and the connected *archifood* (acronym of *architecture* and *food*) can provide, together with the *earthen architecture,* potential sustainable solutions and visions. There is, in fact, an increasing need for innovative and integrated disciplines, which require a certain degree of permeability and flexibility of professional figures, policy-and-decision-makers and expertise in territorial governance. The research presented in this part of the thesis intends to bring into mainstream discussion the *agritecture* and *earthen underground architecture,* in the framework of previous experience of the UNESCO-WHEAP Programme, as fundamental proposals for a visionary future for the Nile Basin. The research will contribute to be a founding cornerstones through the methodology followed studying the Nile Basin territories in a sustainable perspective. This approach can provide a strong push to an innovative and hybrid urban and architectural design incorporating agricultural farming, horticultural practices embedding nutrition culture and related issues and domains for the benefit of the majority of the smallholders in the rural and urban context.



Country	Population 2014
Burundi	10,483,000
Democratic Republic of the Congo	69,360,000
Egypt	83,387,000
Eritrea	6,536,000
Ethiopia	96,506,000
Kenya	45,546,000
Rwanda	12,100,000
South Sudan	11,739,000
Sudan	38,764,000
Uganda	38,845,000
United Republic of Tanzania	50,757,000
	464,023,000

Figure 27. **Nile Basin Riparian States Population in 2014 and projected population growth**

4.2 A Research on Sustainable development: Underground Earthern Architecture for a new subterranean dimension.

Sustainable development is based on the conscious use of environmental and energy resources taking into consideration the social equity and economic viability, an often-quoted definition of sustainable development is defined in the Brundland Report: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". (Iris Borowy, Defining Sustainable Development: (Brundtland Commission), 2014). Facing global pollution, increasingly linked to the building production and related growing consumption of land to support the urban expansion, it is essential, for a sustainable future of the planet to identify alternatives to this trend as well as finding appropriate solutions to the very challenges.

The research presented in this tie of the thesis on a sustainable approach in architecture, stresses in fact the importance of controlling energy consumption and limiting the environmental impact of constructions and related pollution, due to the production and transport of building materials and on the other side there is an increasing need to save soil

useful for agricultural production as well as the necessity of preservation of parks and green reserves to secure and store oxygen.

Therefore facing such environmental emergency, sustainable architecture emerged as a reaction to the serious environmental crisis, whose most significant symptoms are today global climate change, depletion of non-renewable resources, air, water and soil pollution, growing consumption of drinking water, hydrogeological problems, loss of biodiversity and irreversible and unrestrained consumption of increasing portions of land.

The on-going urbanization and Agrifood system revealed to be unsustainable, following the current pathways, which are not reconciling the nature conservation while launching sustainable development. The current development models are too much resource demanding and resources consumptive in terms of energy, land, forest, water, biodiversity, fauna and flora. To address such challenging reality innovative approaches are needed transcending the boundaries of the current disciplines or integrating them, finding appropriate solutions to anticipate a possible urbanizing population concentrated in limited spaces with limited sustaining resources. The emerging Agritecture and connected Archifood together with the earthen architecture can provide possible and potential sustainable solutions and visions. These new disciplines underline the need to consider the consequences, in terms of livelihood options of the new urban population by limiting the import of food in the cities and related pollution due to transport needed to provide food to the new inhabitants of the city. Similarly new architectures and settlements must limit their consumption of soil to favour both the maintenance of productive soils and green areas. *Agritecture*, to which this paper intends to give a fundamental value in order to contribute, with concrete case studies, projects and visions, to promote this new discipline as being able to solve the complex problem linked to the tumultuous urbanization of the planet, as in the case presented, in the Nile Basin. These disciplines can provide a strong push to the urban planning, design, and sustainable architecture incorporating agricultural farming and practices embedding the food and nutrition culture for the benefit of the smallholders in the rural and urban context (Bertagnin *et al*, 2015). There is a need of innovative and integrated disciplines, which require certain degree of permeability and flexibility of professional figures, policy makers and territorial governance. The interdisciplinary research presented in this paper intends to bring into mainstream discussion the Agritecture and the earthen architecture as a fundamental proposal for the visionary future of the Nile Basin and contribute to be a founding cornerstone

throughout the methodology followed studying the Nile Basin territories in a sustainable developmental perspective.

The research is part of the WHEAP / UNESCO programme (*Colloquium*, UNESCO WHC, 2012) and its strategic objectives represent the basic reference scenario of the whole research which is to promote a particular sector of the world's architectural heritage and African vernacular architecture, the *underground earthen architecture* with the purpose of proposing a concrete example of *Agritecture* for the future of a vast area of the planet, such as the Nile Basin. Earthen architecture is, in fact, one of the most original and creative expressions of the ability of humankind to create, only with readily available resources and materials, a sustainable housing and built environment.

The proposed solution tries to outline, in a holistic vision, a possible solution to the housing problems of the future urbanizing inhabitants and to their need to food and feed, with reduced impact on the environment, resorting to a particular form of architecture that in addition to save energy and construction materials optimizes the space and, at the same time, makes possible the land-saving for agricultural production.

4.3 Underground Earthern Architecture: A challenging Solution

The research has focused on the study of different types of earthen underground architecture in order to emphasize its vernacular values as well as the contemporary works so as to contribute to a possible its contemporary exploitation.

The research has also shown that in various parts of the planet still exists a rich tradition with different types of vernacular underground architecture. This rich heritage only recently revived an interest in deepening the theme of the use of subsoil, able to respond to the current ecological and environmental needs.

The full benefits of the underground option can be summarized in some key focal points. First is the possibility of creating new settlements within a limited visual impact. Another evident advantage is the mass effect of the earth in the building envelope providing a protection that ensures a better thermal insulation and translates into significant energy cost savings. Furthermore in the earthen building envelope the preservation of soil permeability and fertility is guaranteed in such a way the earthen surface can also be exploited for agricultural purposes.

For what concerns the earthen underground architecture, it should be emphasized that

the term does not merely mean underground caves or dark rooms made deep underground, but any constructive solution that uses excavated earth or rocks as protection from climatic agents. This is not an exaltation of the experience of vernacular architecture, but a real viable alternative in the direction of sustainable development.

Contemporary underground architectural features have their roots in the field of vernacular architecture and the main outcome of the research carried out has been to propose some meta patterns for contemporary settlements to shelter new urban inhabitants, without any renounce to the modern and comfortable conditions.

The achievement of the internal comfort of the environment in modern buildings is delegated to plant, which reduces the external climatic conditions to create a more pleasant indoor climate with the seasons. Unfortunately, the operating costs of these facilities are often very high and constitute the largest expenditure on domestic environment. The aim is therefore to propose architectural solutions, adaptable to the site conditions, which limit the costs using the earth as insulation and protection against adverse weather conditions, and can therefore handle the expansion of residential areas in terms of soil consumption. The study of the vernacular tradition and the most contemporary hypogea projects has revealed several typologies. Actually the whole underground architecture can be reduced in a limited number of patterns, creating five families in which can be included all the existing features. These meta-design schemes have different levels of effectiveness, depending on the environmental and geological conditions, and can be modified as needed. During the interdisciplinary research, through a modelling software and simulation of energy losses it was possible to quantify the benefits in terms of energy, and therefore related costs, demonstrating how the earthen underground architecture can represent an advantageous alternative for new sustainable settlements.

4.4 Finding Solutions: An Innovative Architecture of Subtraction

First human settlements over the millennia basically used pre-existing geological creations such as the caves and along the centuries human being has always built and inhabited underground structures for different reasons. First reason to inhabit underground structures is to provide an indoor comfort in moderate or extreme climates without major expenditures of energy. At the same time religious underground spaces and caves have been always connected to the world of spiritual ceremonies as well as for defensive reasons or for storing food have caves been inhabited.

The idea that the bowels of a mountain or the subsoil of a plateau can be sites suitable for contemporary human settlements may seem unreasonable or, at least anachronistic but the subsoil, on the other hand, has always been the primary place for cemeteries and catacombs, quarries and mines, and currently represents the urban space in which are situated secondary functions at the service of urban life that takes place on the surface such as sewerage, transport, dumps and various ducts.

There is no surprise, therefore, if the “subterranean dimension” is instinctively perceived as unhealthy, dark, damp, stuffy and funereal. But it is not equally spread the idea that the subsoil can accommodate advanced phenomena of human activity, such as real functional and viable underground houses or quarters. These contemporary architectures are the most immediate evolution of prehistoric shelters in natural caves and caverns and are the result of excavation of rocky structures, both in vertical or horizontal direction. The reasons that led people to seek shelter underground or in excavated rocks are, as already seen, multiple and intertwined in different sizes, depending on the geographical location and climatic and environmental issues.

This architectural phenomenon is the result of an act of subtraction, made by “prodigious builders “ (Rudofsky, 1977) towards the ground and seems mainly localized in a climatic zone between the temperate and equatorial areas and knows the maximum development in the arid regions and in the territories around the Mediterranean basin. These zones are characterized by strong seasonal and daily temperature range, low and discontinuous rainfall.

Facing such kind of climatic issues, from a strictly climatic point of view, the underground house can provide a good answer, because it stabilizes the temperature of the interior mitigating the diurnal and seasonal variations while earth represents an excellent "moderator" of the thermal fluctuations. Its properties depend on variable factors, such as the slope and the colour of the earth, the presence or absence of vegetation and other geo-climatic factors that could determine the greater or less absorption of solar radiation. In windy areas, particularly in those desert, where the winds are sand loads underground architecture can provide a precious shelter, thanks to the earthen massive casings that are resistant to the mechanical action of the currents. It Is important also to highlight how all these underground habitats are situated in zones practically free of vegetation and timber, indispensable material for the construction of horizontal structures. This deficiency has been addressed through the use of different building technologies such as vaulted roofs being the excavated rock self-

supporting and despite the simplicity of construction techniques, the underground architectural features display also a great flexibility due to the ability of modelling the domestic space to customize it, enlarging the existing rooms or adding niches or rooms whenever it is deemed necessary. (Bixio R., 1995).

The research carried out has also considered various examples of the architecture of subtraction around the world, trying to classify the different types of underground settlements. The research identified two main groups: the natural configurations, settlement using cavities and natural conformations and the excavated architectures in the strict sense, originating from man-made excavation action.

Among the natural configurations the caves can be classified as underground cavities generated by spontaneous phenomena (karst, erosion or volcanic eruptions), in which the subtractive action is the result of natural events. The caves are the earliest form of shelter, used by men in a remote age, ensuring an effective thermal insulation and providing protection from the elements and from wild animals. In fact initially, the inhabitants did not have tools and appropriate techniques to attack a hard surface like a rock wall, that's why cavities were used in their natural state without making any modification. Huddled facilities are another typology including natural shelters made from large rock ledges, with artefacts that lean against the back wall of these particular cavity. Sometimes the protrusion is of a depth such as to assimilate it to a real cavern. Dug architectures and the underground structures may be developed from the ground level down, deeper. Settlements of this type are located on flat and open areas without natural shelters, and disappear completely from the Earth's surface. The prototype of this typological group is the "patio pit", cavities dug vertically into the ground with circular or square form, from which branches off the living rooms made continuing the excavation in the horizontal direction. The pit structure can ideally be considered the starting point of a double line of evolution that led, on the one hand, the outcrop at the surface, to reconfigure itself in the type of patio house, the other the development of the same underground dimension that evolves into articulated solutions, with more and better structural and functional efficiency.

Rock structures are other typologies of underground architecture outlined by the research, those in which the levels are all carved in the rock along the slopes of mountain ranges or on the sides of the canyon walls. These structures are dug mainly in the horizontal direction or slightly tilted into the mountain and often they take the form of settlements to tiered structure. The subtractive action of excavation involves, in carved architectures, not

only the interior but also the exterior casing, modeled after the forms of architecture built in elevation and reproduces structural patterns, spatial organization, friezes and decorative facades. Among the many possible examples outstanding are two UNESCO World Heritage sites like the city of Petra, where tombs and temples are carved in the rock, reproduce facades from classical geometries or Ethiopian churches of Lalibela, which, carved into the ground, are considered autonomous buildings, combined with the parent rock only at ground level.

In the mixed structures typologies the underground or rock elements coexist with artificial bodies, which extend the cavity towards the outside. It is that developed the underground settlements in a wide span of time. These overlays are motivated by the constant search for better solutions in response to a given context and to the needs of its inhabitants like in the Sassi of Matera, where natural caves, artificial underground cavities, fronts and external bodies built in tuff, shaping a sloping terraced and stepped urban fabric.

The research has also stressed that the advantages related to the realization of an underground residence depend on the fact that the soil with its mass provides an important contribution in the process of insulation (thermal or acoustic). The degrees of relationship with the ground can be varied and complex; similarly the benefits listed may be more or less consistent according to the type of settlement realized.

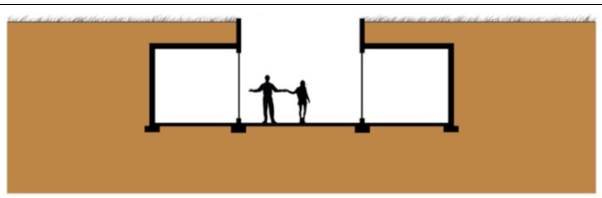
The relationship with the earth, the structural system, the materials, the climate, the construction costs and the power consumption will vary from time to time exactly as in the case of traditional construction at ground level. Soil is a non-renewable resource, but we are changing irreversibly large portions of the territory. Therefore prevention is the most sustainable form of land management, both from the environmental and economic point of view. The overbuilding also reduces many of the beneficial effects of the soil, reducing the rain drainage, stretching the absorption times by the soil. Waterproofing the soil means also to significantly reduce its evapotranspiration while the overbuilding of agricultural areas also poses serious problems to the food supply. On the contrary, as demonstrated by research, underground building offers the possibility to preserve the soil, devoted to agricultural purposes and in densely built urban areas the underground architecture can generate free green public spaces like parks or gardens. In these cases the protection of the soil has not only hydrogeological value but decreases the density and allows the sunlight to reach parts of the city otherwise evermore in the shade. Another important advantage of the earthen underground architecture is the minimal visual impact in fact spaces built, partially or totally, under the ground level, are very much less visible. Sites where the environmental component

of the landscape constitutes a booster element in historical sites in which a modern building would be destructive. More generally it is evident that some types of buildings can be undesirable to the ground level. The construction of parking lots, warehouses, and industrial areas below the ground level would safeguard the aesthetic component of an area. As already mentioned the construction of underground spaces, in areas densely urbanized, can provide free land to other uses for the community, such as green spaces. Moreover the underground structures have virtually unique features in the field of energy saving being most of the benefits of course related to the surface in contact with the ground. Generally the more structure is inserted into the ground the greater are the energy benefits with the need to conceive appropriate openings. Valid compromise solutions involve partially buried structures, with the reduction of the openings to ensure the highest energy savings. Other benefits, related to the energy saving, are the reduction of ventilation dispersions and of heat losses, an easy cooling, the mitigation of daily temperature trends and the phase displacement of seasonal variations.

For what concerns the underground architecture features there are various possibilities of interaction between the built space and the ground and at the extremes of these possibilities there is on the one hand there are traditional buildings constructed on the surface, and then covered by a layer of soil and, on the other hand, settlements spread completely below ground level. In between is a wide range of possibilities that can be classified mold them into some types. The study of the vernacular tradition has identified different types of settlements scattered around the world, which originate from various cultures in different climates.

The development of research, in its central part, has tried to bring all cases of underground architecture analyzed into five synthetic patterns, which can be adapted from time to time to the needs related to different environmental and climatic conditions. Each pattern has limitations and advantages according to the different combinations of the required needs. Below are presented the patterns, outcome of the research carried out, that describe the potential of the new approach representing a tangible example of Agritecture.

Figure 28. **PATTERN 1: UNDERGROUND PATIO**



The underground space is lying just under the surface. This space can be extended deep in the ground but it has direct contact with the above ground and the natural light. The surface is perforated by patios, atriums and domes.

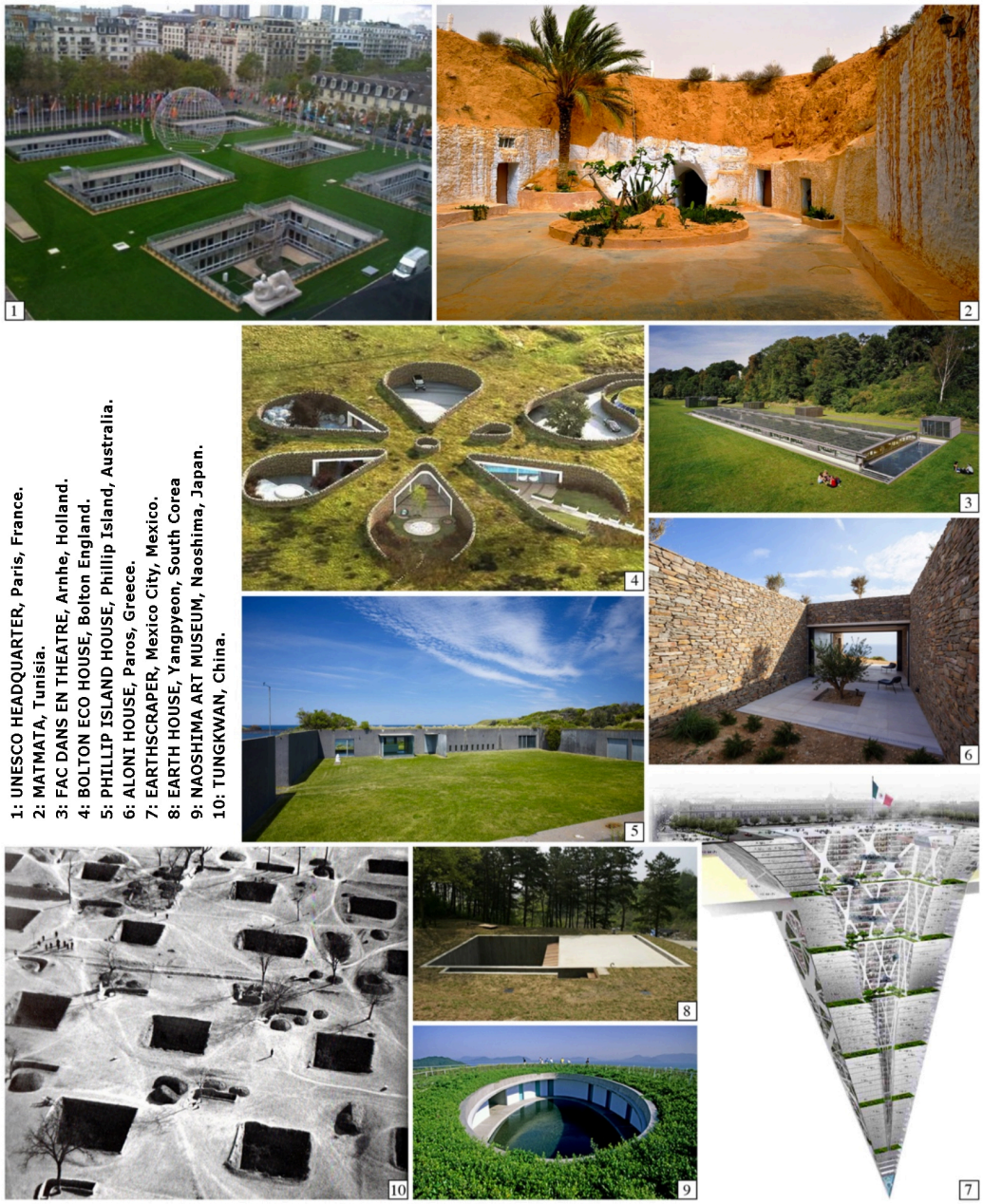
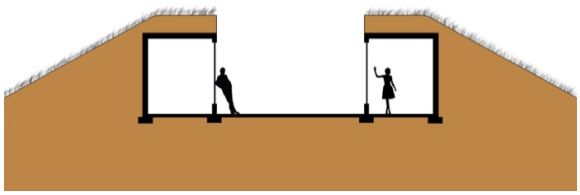


Figure 29.**PATTERN 2: BERM PATIO**



Underground space generated by an artificial berm. The surface is perforated by patios or atriums, which let the natural light penetrate inside the house. In any case the view of the sky provides contact with the aboveground.

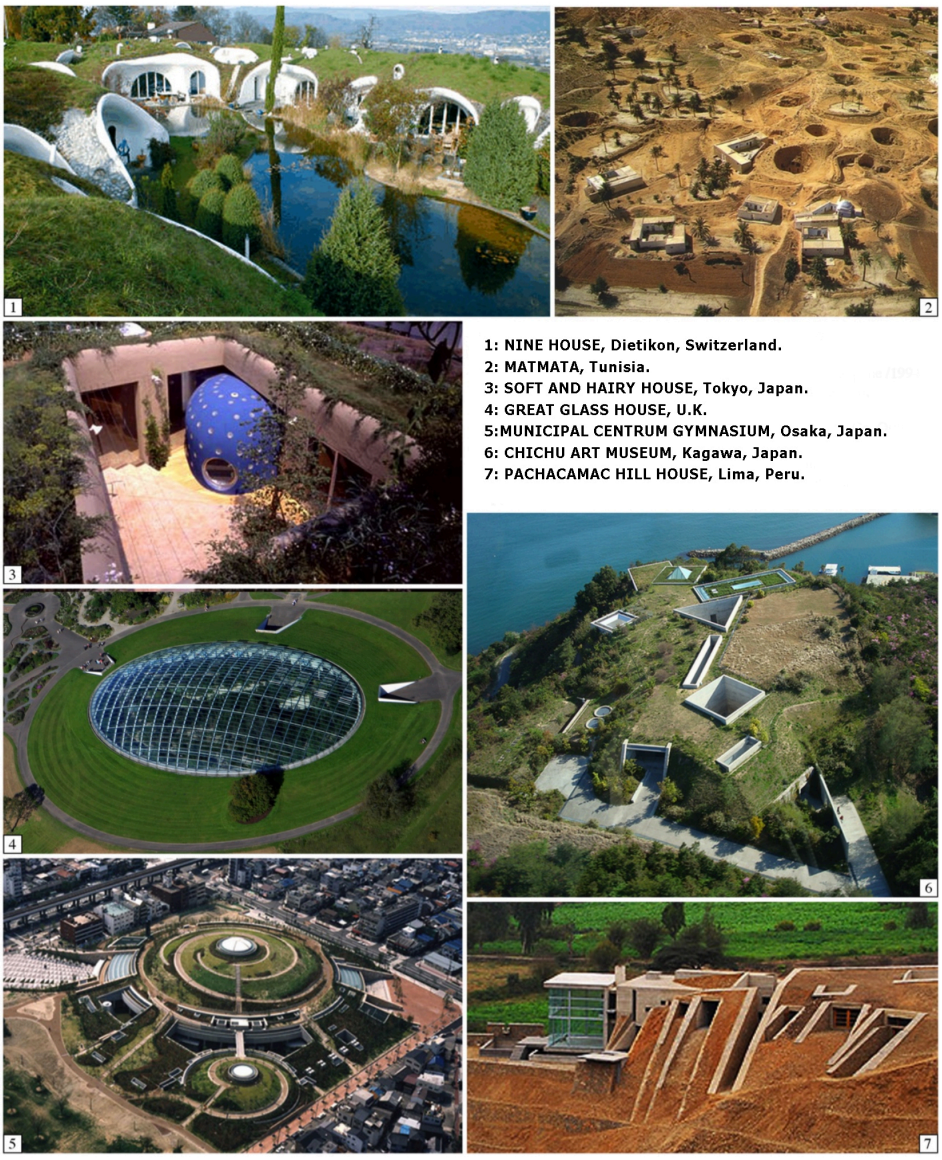
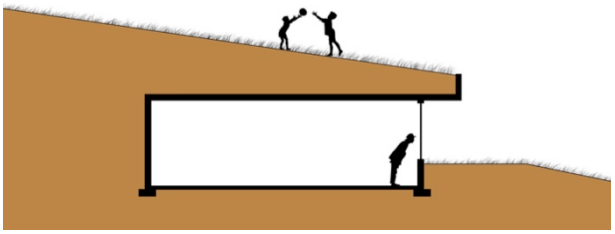


Figure 30. **PATTERN 3: ONE SIDE BERM**

The residential spaces are at the ground level, but one side of the building is protected by an artificial slope. It is not a true underground space but an earth-covered one.

1: PHILLIP ISLAND HOUSE, Phillip Island, Australia.
2: COTTAGES AT FALLINGWATER, Pennsylvania, U.S.A.
3: ALONI HOUSE, Paros, Greece.
4: PREFECTURAL INTERNATION HALL, Fukuoka, Japan.
5: MALATOR, Druidstone, England.
6: CENTRAL PRE-MIX COMPANY, Washington, U.S.A.

Figure 31. **PATTERN 4: HILLSIDE SPACE**



This residential space is dug into a natural slope. In general the deeper the structure penetrates into the earth, the more the structure will benefits in terms of energy conservation.

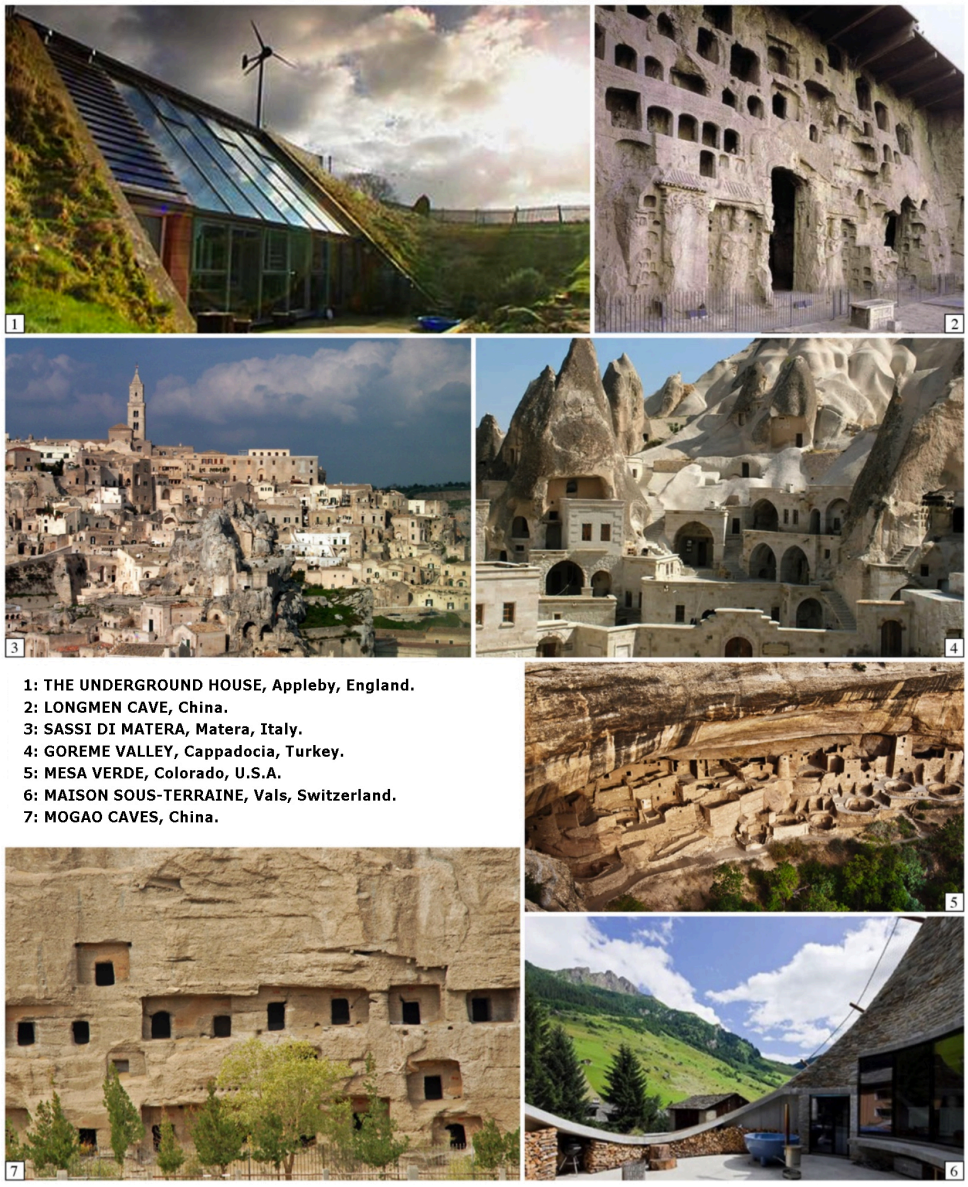
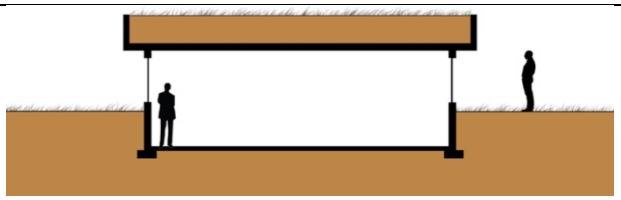


Figure 32. **PATTERN 5: EXCAVATED EARTH-ROOF**



The residential space is partially excavated in the ground and partially exploits the heat storage capacity and the stability of ground temperature. The earth covers the shelter, creating a garden roof.

1: CASA DE RITIRO ESPIRITUAL, Sevilla, Spain.
2: THE CIVIL ENGINEERING BUILDING, Minneapolis, U.S.A.
3: TEMPPELIAUKIO CHURCH, Helsinki, Finland.
4: ICELANDIC TURF HOUSES, Saenautasel, Iceland.
5: WATER TEMPLE, Hyogo, Japan.

4.5 Urban Sprawl in Africa: The Role of Urban Agriculture and a Sustainable 2030 vision for the Nile Basin Based on Earthern Underground Architecture

The final part of the research presents a vision on the possibility of identifying a sustainable alternative to the needs of housing for an increasing population who will settle in the major urban agglomerations and metropolitan areas of the Nile Basin. In the proposed Nile Basin 2030 vision is considered the energy and soil saving that can be achieved according to the proposed settlement patterns based on the innovative earthen underground habitat.

The vision begins by noting that Earth's population, especially in Africa, will continue to grow steadily at least until 2100. This is the last message coming from the UN, forced to review data on the African population boom, correcting in part the provision provided a couple of years ago when it was believed that population growth was bound to a halt in the coming decades. This demographic outlook is based essentially on two factors, the life expectancy and the fertility of women and both factors have proved to be growing despite predictions that gave them as stable or even declining. The UN experts had, however, apparently overestimated these factors. Today Africa has forests and deserts, including savannah, just over one billion inhabitants, and it will, expects the UN, more than double (2.4 billion) in 2050 and four times as much demographic expansion will involve the whole of Africa, are geographically, settlements, or trade will be even greater in certain areas.

One of the most important poles of attraction in terms of population of Africa consists of the Nile Basin as well as the metropolitan area of Addis Ababa. Urbanization in Africa has largely been translated into rising slum establishments, increasing poverty and inequality but however, there are large variations in the patterns of urbanization across African regions. The relatively fewer slums in North African countries are mainly attributed to better urban development strategies, including investment in infrastructure and in upgrading urban settlements. In contrast, Sub Saharan African countries have the lowest proportion of urban population (32.8%), but the highest proportion of slum dwellers (65%). Most of African cities are characterized by insufficient basic infrastructures, particularly in low-income areas, therefore 60% of African citizens live in places where water supplies and sanitation are inadequate. As most of the migrants from rural areas are uneducated/unskilled, they end up in informal sector (no taxes, no rights), which accounts for 93% of all new jobs and 61% of

urban employment in Africa. As a consequence, many African cities have to deal not only with slum proliferation but also with increasing insecurity and crime.

Another challenge from Africa's rapid expected urbanization is the increasing pressure of urban populations on natural resources and the environment. The expansion of cities is generally connected to the destruction of forests and other natural environment or ecosystems and increasing pollution (especially air pollution) with the related diseases and furthermore urban sprawl reduces also the land available for agriculture. Such urban growth is expected to significantly increase household food demand, in urban areas, at the same time as rural-urban migration is contributing to a declining rural agricultural productivity due to loss of farm labour (Lee-Smith, 2010). It is within this context that urban agriculture stands to play a strategic role not only enhancing urban food and livelihood security, but also in meeting overall national food self-sufficiency. A general consensus about the exact definition of urban agriculture does not exist. However, many researchers tend to define urban agriculture as any agricultural enterprise within or on the borders of a town, city, or metropolis that grows or raises, processes, and distributes food and non-food products (Moustier, 1999); (Mougeout, 2000).; and (Bryld, 2003).

In addition, the recent concern about climate change and the need to reduce the environmental impact deriving from the transport of long distance food has boosted the need for food production close to population centers. Urban residents, who generally are dependent on the urban market for access to food, purchase more than 90% of their food (IFPRI, 2003), and with the rapid growth of Africa's urban population, demand for fresh foodstuffs will inevitably increase.

Urban agriculture, therefore, can resolve one of the most pressing issues for national policymakers: how to solve the increasing food need of Africa's expanding urban population, an issue that has also attracted the attention of international development agencies, non-governmental organizations, and a host of foundations.

That's why the government should take an official position to achieve national food sufficiency through domestic production, international markets, or some combination of the two, in terms of quantity of urban land devoted to agricultural use, the use of inorganic fertilizers, and the extent of waste recycling. The increase of the population in urban and metropolitan areas will change irrevocably the lifestyle of the people and the main negative consequences expected of urban population are increasing consumption of portions of

territory, increasing demand for energy and air and water pollution.

Therefore, through urban planning instruments and a forward-looking social policy and attention to environmental issues, we must be able to handle this urban sprawl by ensuring satisfactory quality of life levels, with better sanitary conditions, adequate infrastructure, and limiting the loss of land for agriculture. The latter aspect is reflected in increased availability of productive agricultural land use, keeping romantically linked with traditions without turning back on a past that comes from cultivation, self-support and knowledge of own land.

In this scenario the earthen underground architecture offers the possibility to limit the negative impact of urban expansion in at least two of the previously mentioned critical issues, creating new settlements decreasing energy demand with a lower consumption of land than traditional solutions.

Through the study of the underground vernacular tradition, which has produced so many and different cases around the world, combined with an analysis of the most modern examples, as mentioned, it was possible to identify a limited number of solutions underground architectural design. These patterns were necessary to reduce the variables related to soil, climate and orientation and to understand, what type of underground solutions could better meet the needs of the sustainable design in the different areas considered in the vision. In fact, these patterns show the absolute modernity of existing contemporary architectural solutions since they have already been tested in several countries. If we consider that the increase of the population in urban and metropolitan areas in the Nile Basin will change irrevocably the lifestyle of the people It is pertinent to the idea that these lifestyles can be also defined through a participatory process. This process will involve the new urban communities through their orientation towards new forms of more sustainable urban habitat, both ecologically and economically as demonstrated by the contemporary earthen underground habitats.

It is necessary to remark that the five patterns are only basic models, guidelines for a more detailed design, but the gains in terms of energy use and land use is clear and derived from the calculations and estimates made during the research carried out.

Percentages shown may be improved with technological solutions to reduce much more the energy demand while the benefits in terms of land use with no-waterproofing of terrain offers more possibilities through these five schemes designed.

Thus the suggested solutions in the different contexts identified have an essentially methodological value, in the sense that they are applied to urban areas and other sites to demonstrate the adaptability and feasibility of these patterns to the various geographical and

environmental conditions of the Nile Basin.

Figure 33. **PATTERN 1:**

EXISTING URBAN FABRICS IN THE NILE BASIN:

Cairo, Egypt | Kharhoum, Sudan | Juba, South Sudan

ALTERNATIVE UNDERGROUND SOLUTIONS:

Arnhem,Netherlands | Arizona,U.S.A. | Tungkwan, China

The pattern number 1 has been applied to 3 different urban realities such as the outskirts of Cairo, downtown Khartoum and Juba foreseeing the impact of an underground habitat completely submerged below ground level, with a use of large masses of land with stable internal temperatures and an excellent level of thermal insulation and natural ventilation guaranteed by the domestic courtyards of the various houses. The visual impact is virtually zero, since living spaces are developed entirely underground, and the only sign of human presence consists of the 'hole' which creates the courtyard overlooked by residential environments.

An efficient system for conveying water reuse and eliminates the risk of flooding of the central court in the case also of heavy rains.

Figure 34. **PATTERN 2:**

EXISTING RURAL SETTLEMENTS IN THE NILE BASIN:

ALTERNATIVE UNDERGROUND SOLUTIONS:

Dietikon, Switzerland

Phillip Island, Australia

Lima, Perù

In the second pattern residential environments are completely surrounded by land except for the central courtyard; for this reason, from the energy point of view we will have many coincidences with the pattern 1. The isolation and ventilation are guaranteed by the thickness of the earth placed in contact with the walls. The amount of the external surfaces exposed to atmospheric agents is particularly reduced, like the pattern 1, for which in the case of hurricanes or fires is guaranteed a high level of security; even in case of strong flooding the outer slope protects the house from the water. There will be low costs of maintenance for external surfaces of the walls.

Figure 35. **PATTERN 3:**

EXISTING RURAL SETTLEMENTS IN THE NILE BASIN:

Ethiopia

Egypt

ALTERNATIVE UNDERGROUND SOLUTIONS:

Paros Island, Greece

Fukuoka, Japan

Phillip Island, Australia

The pattern 3 is proposed for innovative sustainable settlements in the Ethiopian Plateau and for the mountainous areas of Egypt where in the alternative earthen architectures the earth has a function of coverage above the ground level forming the roof insulation. The main façade is totally free with a marked improvement from the point of view of the psychological impact, one of the main problems of the previous solutions. This aspect is certainly subjective, but it is still tied to the ability to create openings and alleviate the looming sensation of the earth around the house. From the energy saving point of view, the isolation depends on the thickness of the layer of ground cover. The pattern, in fact, is presenting a fully covered and hidden side and instead an open side on the landscape, therefore is well suited to environments of high landscape and historical value.

Figure 36. **PATTERN 4:**

EXISTING SETTLEMENTS IIN THE HILLS IN THE NILE BASIN:

Ethiopia

South Sudan

ALTERNATIVE UNDERGROUND SOLUTIONS:

Vals, Switzerland

Cappadocia, Turkey

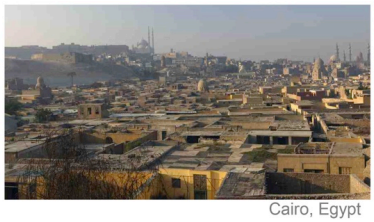
Barcelona, Spain

The pattern 4 is suggested here in the hilly landscapes of Ethiopia and South Sudan and is subject to the existence of a natural slope of easily workable material. Like the pattern 1, the construction activity is limited to the extraction of the material from the ground (or the slope) and includes a supporting wall structure, with no carry-over of the earth. In both cases, under certain conditions the wall structure, from a structural point of view may be superfluous. The positive aspects of this solution are related to finding the correct orientation to be taken to the openings. The large mass of earth and rock placed behind the housing is an excellent insulating layer and ensures the stability of the internal temperatures and, depending on the climate, can be more or less deeply into the slope. With this solution, the visual impact is quite low when compared with the traditional buildings, but it still creates a clear cut on the side of the hill or mountain. The maintenance request, also in this case it is extremely low.

Figure 37. **PATTERN 5:**

SETTLEMENTS OF PLAIN OR ALONG THE RIVER IN THE NILE BASIN:


Aswan, Egypt


Cairo, Egypt


village, Ethiopia

ALTERNATIVE UNDERGROUND SOLUTIONS:


Nanyang University, Singapore


U.K.


Sevilla, Spain

The pattern 5 is the solution that is closest to the traditional construction industry and is recommended for lowland settlements or along the river. In fact it is a settlement inserted into the soil to a depth varying according to climate and needs; whose coverage includes the use of the earth as insulation. The roof can be used for the cultures, and the visual impact of this solution is low when compared with the current constructions on the surface, although not reaching the levels of the previous solutions. Since the structure of the building is in good part inserted in the ground, in case of earthquake, it would be integral with respect to ground movements, limiting the potential and possible damages.

From the point of view of the durability of the construction elements, special care is needed the isolation of the cover, which constitutes the only critical point. This pattern is much more versatile than previous, and soil moisture is the only problem for its implementation. Depending on the chosen area also, you can implement a number of measures to make the most of the features of the pattern, how to extend the flat roof to create a porch for the defense from the sun of the hottest hours, or limit this ledge to allow the most solar contribution possible to increase the passive collection of solar light.

4.6 Final Thoughts

The diagram proposed by Figure 38 gives an idea of the great advantages related to a subterranean habitats option and of the efforts that can be made to save energy and fertile soil

useful for agriculture and consequently of the agricultural production for the nourishment of the new urban and rural population in the coming years in the Nile Basin. This scheme represents the latest research result and intends to be a contribution to the research for a sustainable habitat in the Nile Basin.

Estimated percentage of energy saving and soil in relation of patterns of underground earthen architecture in different settlements along the Nile Basin.

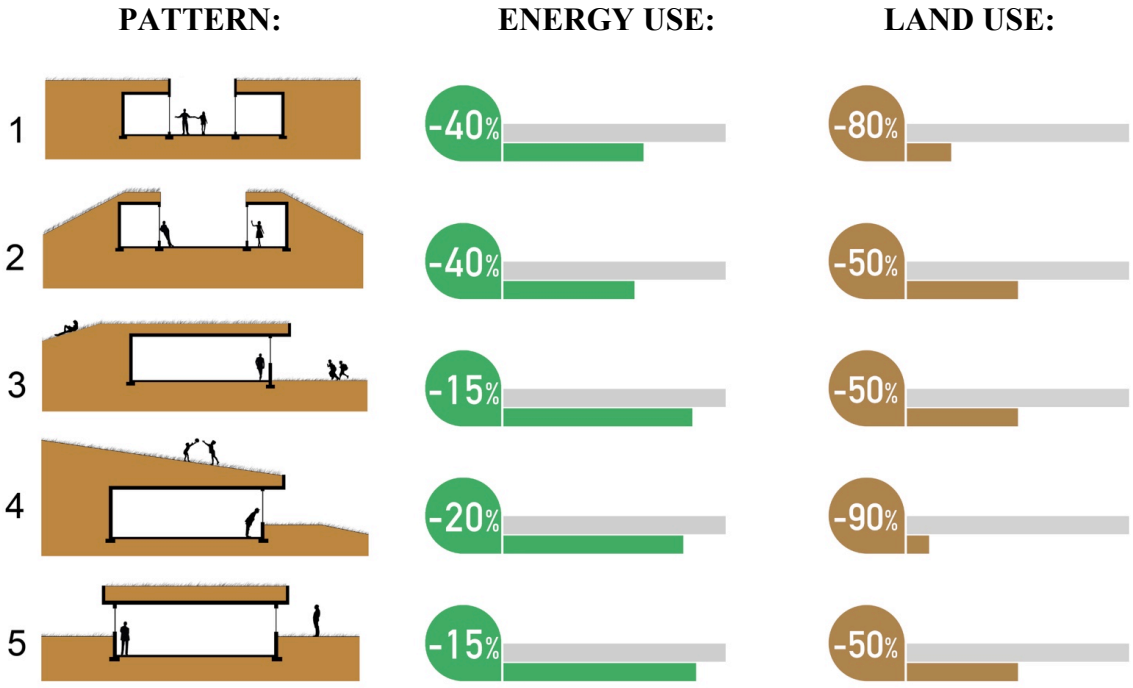


Figure 38. **Estimated percentage of energy saving and soil in relation of patterns of underground earthen architecture in different settlements along the Nile Basin.**

The main difference between the five metaprojectual patterns is given by the quantity of earth isolating the new housings from heat loss as well as the amount of fertile soil that is spared and which can be employed for the production of food. In this sense, the present paper is a contribution to founding the new discipline the Agritecture.

The most extreme solutions proposed consist of the first two patterns stresses the role of the earth construction but also clearly indicate some critical points in the underground design. In any case, the estimates proposed by the research suggest the underground earthen architecture as an appropriate model for the solution of the integrated problems such as the need to provide a shelter for a growing population, conserve soil useful for agricultural production and save energy for a brighter sustainable future in the Nile Basin.

Sources of Images

All images used in the research are taken from the Internet and thus copyright-free. The conception and design of the 5 patterns copyright© all rights reserved Mauro Bertagnin, Giovanni Viola

This part of the thesis is a collaborative laboratory work achieved by Professor Mauro Bertagnin, Mohamed Yassin and Giovanni Viola set during the didactic laboratory on the Sustainable Architecture, which had focusing themes around the Nile Basin Vision 2030.

Chapter 5: City Region Agrifood Systems in the Urbanizing Nile Basin Community

5.1 Abstract and keywords:

Almost half billion persons in and within the Nile Basin territories depends on Agrifood systems for their food and nutrition security. The bulk majority of the Nile Basin population and communities are concentrated around water bodies and relaying more and more on diminishing resource base of land and mainly water, which are *per se* so limited or scarce. The current societies in and within the Nile Basin are undergoing voluntary and involuntary accelerated urbanization process. This rapid urbanization is dictated by the classical pushing and pulling factors affecting the rural urban or urban to urban migration processes including the peri-urban immigrant farmers who hardly get the chances of socio-economic inclusion in the urban planning only through the informal and to some extend delabidated settlements around the urban dwellings. This implies also urbanizing more and more the agriculture in formal and informal patterns pushing it to be agriculture in more architectured setting (agritecture), Agritecture is a blended agricultural science and practices with architecture. It is an emerging inter-multi-transdisciplinary domain inspired to address the urbanizing agricultural society contemporary and future challenge, inspiring overcoming its constraints and capture its potential opportunities. Family farming in rural areas is increasingly loosing terrain at the expenses of the urban farming for multiplicities of reasons and drivers. Urban areas are offering more attractive employment opportunities and better chances of higher income and availability of basic deliverables, basically associated with the industries, trade, technologies, education, health and tertiary sector of services. The Agricultural sector has a shifting and dynamic nature and adaptability related to these urbanization processes, through the urban gardens, nurseries, and other sorts of multifunctional agri-food systems. Actually the urban agriculture should stand as multifunctional fountain for sustainable food systems, as a driver for a resilient and smart agro-food systems, as a catalyst for the socio-economic, cultural, ecological and sustainably urbanizing territories and cities. Ideally, to manage the urban agro-food systems, diversity of competencies and expertise, enriched and empowered human capital are required from the integrateable domains of sciences, engineering, technology, arts, economics, business, law, human and social science, among others.

Keywords: Nile Basin, Agrifood systems, City Region, Urbanization, Community, sustainability.

5.2 Introduction:

The Nile Basin is an extended territory in which the agriculture is showing growing trends in urbanizing setting, the food systems are showing increasing complexities, interdependency and interconnections and prospects. From the Equatorial lakes, to the Ethiopian highlands to the confluence of the white Nile and Blue Nile in the greater Khartoum, the agricultural schemes are extending and intensifying along the shores and banks of the Nile and determining the formation of extended city region agriculture and food systems from Khartoum up to Cairo and the Nile Delta at the mouth of the Mediterranean Sea. The Nile Basin macro-region is witnessing significant climatic variability and above all demographic growth, almost reaching half billion inhabitant and associated fauna and flora, with increasing percentage of Nile Basin population who will be settling in urbanized settings and settlements. The total population of the Nile Basin riparian countries was around 85 million at their independence era in the early 1950's, with projection of over a billion persons within this millennium around 2050. That booming demography requires mitigation, adaptation and adoption of urban agricultural policies and planning, consideration of imperatively adequate food and nutrition systems to cope with this dynamics. In that scenario, the food security and nutrition can be addressed if innovative, integrative, comprehensive systematic approaches are locally and globally elaborated, financed, monitored and followed-up. For instance, urban individual and collective gardens (vertical or horizontal) could be encouraged, trees planting and compensation are boosted, and ecological urban hubs are maintained and invigorated. The lessons and necessity to paradigm shift to vertical or urbanizing agriculture, where there is soil sealing and soil degradation, to green-roofing and vertical agriculture should be deeply and seriously researched by the Nile Basin states to accompany and accommodate that vision in their regional urbanizing agriculture and agritecture. Feasible measures and implementable concerted actions where it is appropriate and economically viable, socially beneficial and environmentally sound and friendly should play a fundamental role in future food and nutrition security and policies to achieve the sustainable development goals and climate change adaptation and mitigation projects, programs and prioritized policies.

The Nile Basin major rivers and tributaries constitute the fluid supporting structure for the urban living, where most of the city regions flourished. Worth to highlight, the Egyptian triangular city region food system. This Egyptian triangular city region Agri-food system is an extending and sprawling city food system sprawled from the greater Cairo to Port Said and Alexandria on the delta of the Nile River along the Mediterranean Sea including the strips to Aswan and Luxor. The structure, conduct and performance of this concentrating city food system markets and places are of dynamic nature, changing locations and allocations. Analogues city food system is formed around the Lake Victoria sub-basin in a circular city food system, with considerable demographic concentration in the Ugandan Entebbe-Kampala-Jinja City Region Agrifood System, in the Tanzanian Musoma-Bukoba-Mwanza City Region Agrifood System, and in the Kenyan Kisumo-Kissi-Homa Pay City Region Agrifood System in Nyanza province. Furthermore, the South/Sudanese City Region Agrifood system along the Blue, White and the main Nile is taking similar inverse extended triangular shape when compared to that consolidated in Egypt.

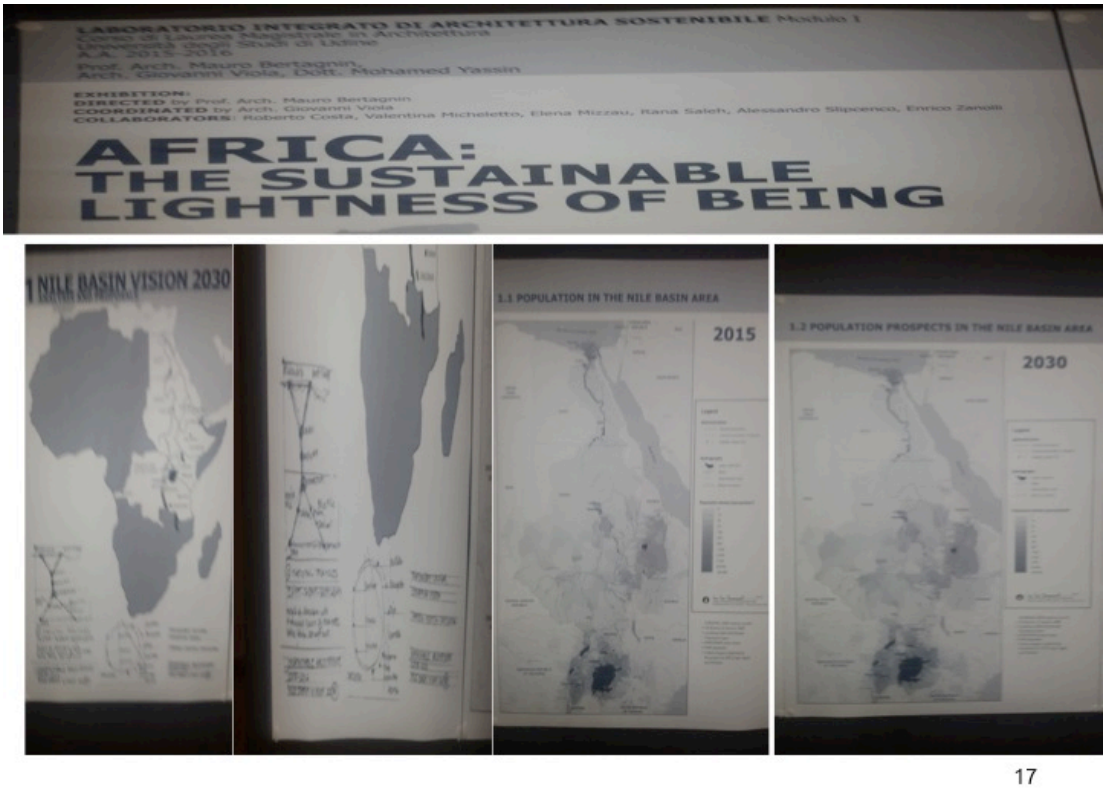


Figure 39. **Sketch for the Nile Basin City Region Agri-food Systems and a vision of the Nile Basin 2030.**

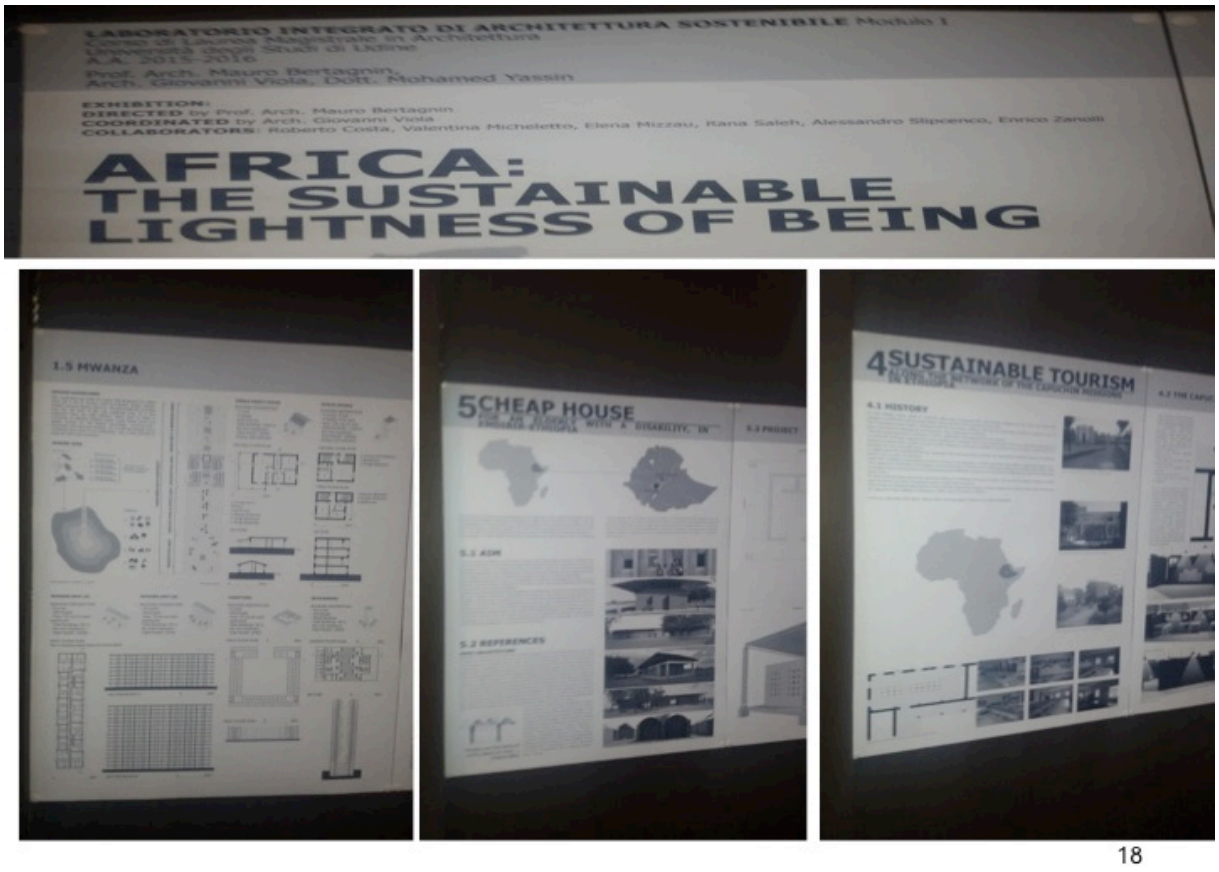


Figure 40. **Sketch for the Nile Basin City Region Agri-food Systems and a vision of the Nile Basin 2030.**

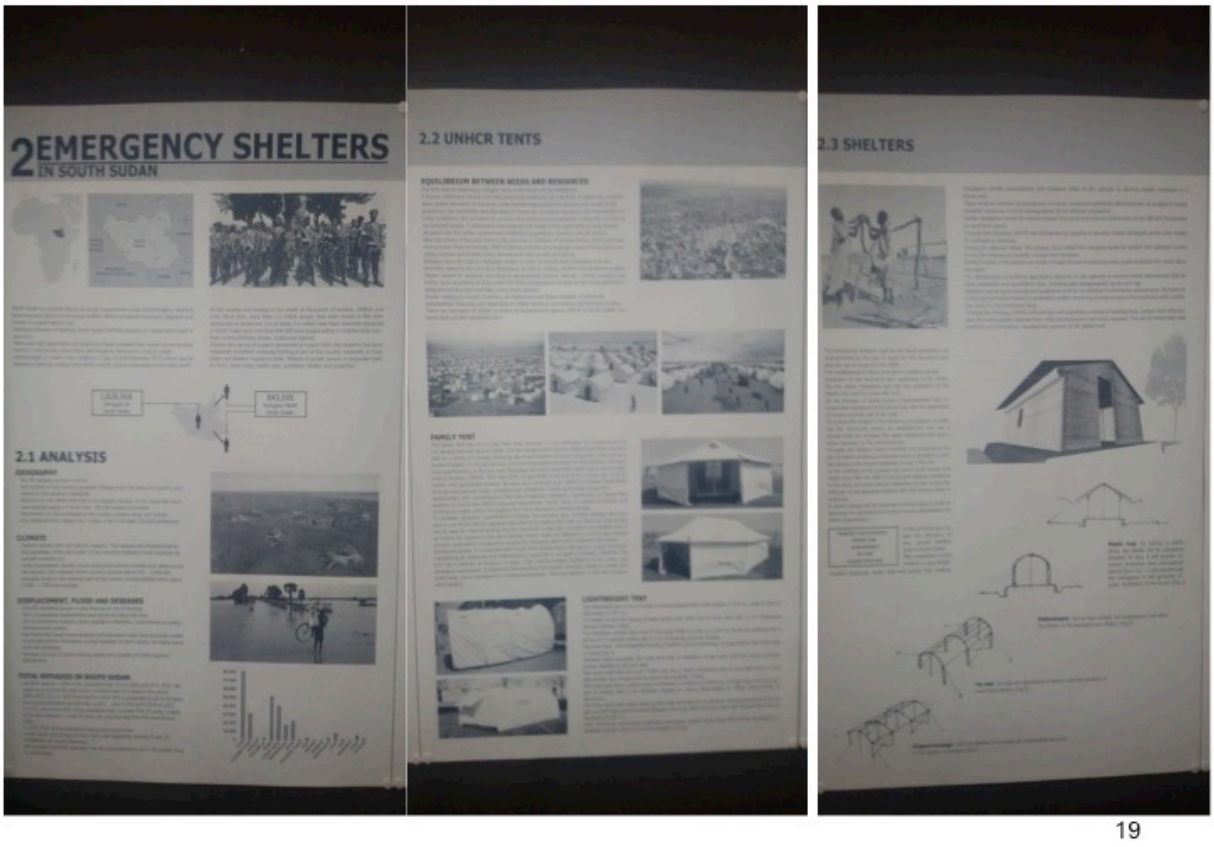


Figure 41. **Sketch for the Nile Basin City Region Agri-food Systems and a vision of the Nile Basin 2030.**

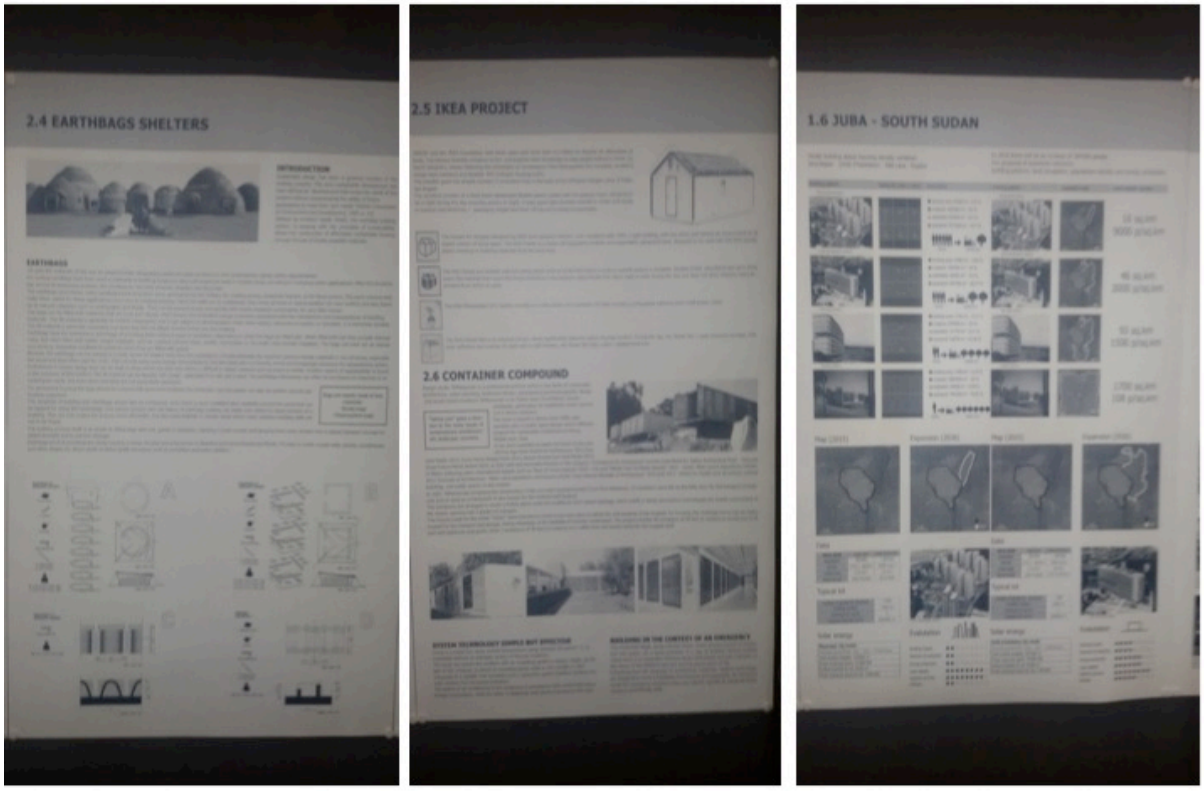


Figure 42. **Sketch for the Nile Basin City Region Agri-food Systems and a vision of the Nile Basin 2030.**

The small urban settlements, which were separated from each other along the shores of the river, are joining one to the adjacent and continuing on an ever-blended urban-rural or urban-urban food systems, where it is hard to distinguish the rural urban benchmarks. The growing infrastructures, continental corridors, roads, energy transmission grids and lines, ports and subsidiary premises enhance the formation of city region food systems. In all these cases, the spatial population distribution, markets and trade are influenced by the climate, rainfall, soil fertility, mineral resources, peace and security, social and economic infrastructures such as transportation networks, education, health, telecommunications, hospitality and tourism facilities. However, the Nile Basin River system appear to be the driving factor sustaining and attracting the formation of these human settlements and the backbone sustaining and supporting continuum city region Agrifood systems, and forming or generating the interdependency and interconnections of these city region Agrifood systems. Previous studies have underlined how food will shape cities even more in the near future, and

those constructive and dynamic interrelations are possible only with the preservation of the informal core of markets that can be assumed as key factors and drivers. Formless strategy provides another type of spatial order and connection between food and metropolis. Along the Nile Basin, generally the market and urban horizontal expansion develops in a sort of informal pattern dictated by the growing population and rural-urban, urban-urban exodus.

To deeply understand the complexity of city region agro-food systems, the Nile basin community should conduct serious research and form broad robust platforms of inter-multi-and-trans-disciplinary oriented human capital composed of flexible or blended competencies from the domains of the environmental sciences, agronomy, engineering and technological sciences, urban and regional planning, architecture, landscape design, economics, social sciences, soil sciences, public health and nutrition to come and act together, recognizing the contribution of urban agriculture to meeting society's basic needs, feeding people, structuring the cities, reconciling the nature conservation while shaping their desirable and inspired sustainable development and inclusive prosperity.

5.2 Foodscape: informal place for sale and trade:

5.2.1 Abstract:

The paper aims to provide an analysis of the current food supply situation through the investigation of some peculiar markets and also new trials concerning food supply in contemporary metropolis. Markets selected and analyzed are taken from extremely different situation on one hand major urban agglomeration based on capitalistic system on the other rural-urban blended conditions, but all of them are related to informal spatial configuration. The connotative informality is the main trait of those realities where food becomes more than an object of consumption and it transforms urban areas, cultural identity and quality of citizen lives.

5.2.2 Introduction:

The relation between metropolis and food is essential to our ordinary life. The different ways through which nourishment reaches our table is a fundamental issue to be investigated even more if we consider that in the next forty years, 75 per cent of the world population will live in boundless urban agglomeration. Cities growth represents also a crucial factor for rethinking food as element and tool for urban design, basically because cities consume three quarters of the planet's resources. The present paper investigates two paradigmatic case study selected as

best practices for their peculiar relation between food and city. The first in-depth analysis is Tsukiji fish market of Tokyo that considers metropolis the place of density, the second is Nile basin regional food system, like in the rural area of many African countries, food is produced and traded near the place of production, generally along the closer road, an original anticipation of the new trend of *food at zero kilometer.* Through this investigation the paper aims to raise the following question: what is the spatial relation between food and city?

5.2.3 Tsukiji fish market: bigness vs smallness:

Today Japan is the world's leading costumer of seafood and it benefits the largest fishing industry. In Japan there is one place where it is almost impossible to separate city perception, food sensuality and economic dimension; this place is called Tsukiji fish market, the largest fish market of the world.

Tsukiji literally means 'land reclamation' and it is refereed during *Edo* period when this area was formed out of land reclaimed from Tokyo waterfront after the *Meireki* fire (1657). The long history of *Tsukiji*, running from 1935 to 2015, underlines the strength and legacy of this spatial system rooted on cultural value opposed to Tokyo bay capitalistic development. Data obtained through analysis, observation and measurement during site visits revealed two antithetical dimensions and organization of the market both necessary for its output and operation: on the one hand the bigness of macrostructure and economic income, on the other hand smallness defined by individual retailers.

Figure 43. **Family retailer in Tsukiji (A.Covatta)**

To begin with bigness, the market occupies an area of 250,000mq and around 50,000 people visit it daily to buy and sell fresh, frozen, and processed seafood. *Tsukiji* functions simultaneously as both a warehouse and a market, offering around 2,000 varieties of fish and

an annual turnover of 5.7 billion dollars. It is a sort of economic indicator of GDP and financial stability of Japan, extending its role beyond the simple realm of a traditional market.
Another important relation based on big scale is established with infrastructure. The construction of Tsukiji market is one of the first examples of the transition between the use of water and the use of rail for urban transport. In fact the railway infrastructure is still visible in the original curvilinear design of the market's main structure that allowed the passage of trains. Finally market preferred, since the '60s, the fast development of the highway system that has intensified within Tokyo area.
Despite the huge data noted above, Tsukiji market expresses itself through a human-scale design approach characterized by smallness and individual/familiar trade. The wholesale is composed by 1.677 retailers where each unit is generated around the individual space composed by a counter, a shelf used to cut fish, a number of other surfaces through which expose goods, a box with the same size of box- shower where retailer makes huge economic transactions, finally telephone and fax through which receive orders.
The small scale is the informal essence of the entire market, it enhances direct feedback between retailers and buyer increasing fish quality based on respect and cooperation between workers, moreover it gives a sense of picturesque attachment also for tourist culture visible in all the entire Tsukiji neighborhood dedicated entirely to food culture.

5.2.4 Highlights and Insights from Nile Basin City Region Food Systems:

The Nile Basin is an extended territory in which the agriculture is showing growing trends in urbanizing setting, the food systems are showing increasing complexities, interdependency and interconnections. From the Equatorial lakes, to the Ethiopian highlands to the confluence of the white Nile and Blue Nile in Khartoum, the agricultural schemes are extending and intensifying along the shores of the Nile and determining the formation of extended city region agriculture and food systems from Khartoum up to Cairo and the Nile Delta at the mouth of the Mediterranean Sea. The Nile Basin macro-region is witnessing significant climatic variability and above all demographic growth, almost reaching half billion inhabitant and associated fauna and flora, with increasing percentage of Nile Basin population who will be settling in urbanized settings and settlements.

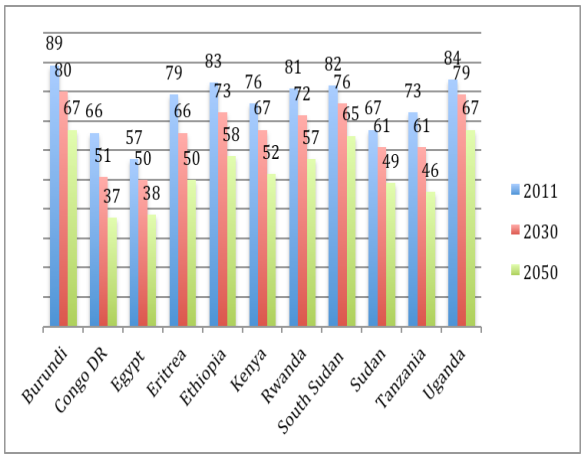


Figure 44. **Author Elaboration; Rural Population in the Nile Basin. As Percentage of total population 2011, 2030 & 2050 projected**

(United Nation, World Urbanization Prospect, 2011)

The population of the Nile Basin was around 85 million at their independence era, with projection of over a billion persons within this millennium. That booming demography requires mitigation, adaptation and adoption of urban agricultural policies and planning, consideration of imperatively adequate food and nutrition systems to cope with. In that scenario, the food security and nutrition can be addressed if innovative, integrative, comprehensive systematic approaches are locally and globally elaborated, financed, monitored and followed-up. For instance, urban individual and collective gardens (vertical or horizontal) could be encouraged, trees planting are boosted, and ecological urban hubs are maintained. The lessons and necessity to paradigm shift to vertical or Urbanizing agriculture, where there is soil sealing and soil degradation, to green-roofing and vertical agriculture should be deeply and seriously researched by the Nile Basin states to accompany and accommodate that vision in their regional urbanizing agriculture and agritecture. Feasible measures and implementable concerted actions where it is appropriate and economically viable, socially beneficial and environmentally sound and friendly should play a fundamental role in future food and nutrition security. The Nile Basin major rivers and tributaries constitute the fluid supporting structure for the urban living, where most of the city region flourished. We will highlight that Egyptian city triangular region food system. It is an extending and sprawling food system from the greater Cairo to Alexandria is on the delta of the Nile River along the Mediterranean Sea, from Aswan and Luxor. The structure, conduct and performance of this concentrating food system markets and places are of dynamic nature,

changing locations and allocations. Analogues food system is the Lake Victoria sub-basin circular food system, with considerable demographic concentration in Uganda, Tanzania and Kenya.

Figure 45**. Lake Victoria Basin.**

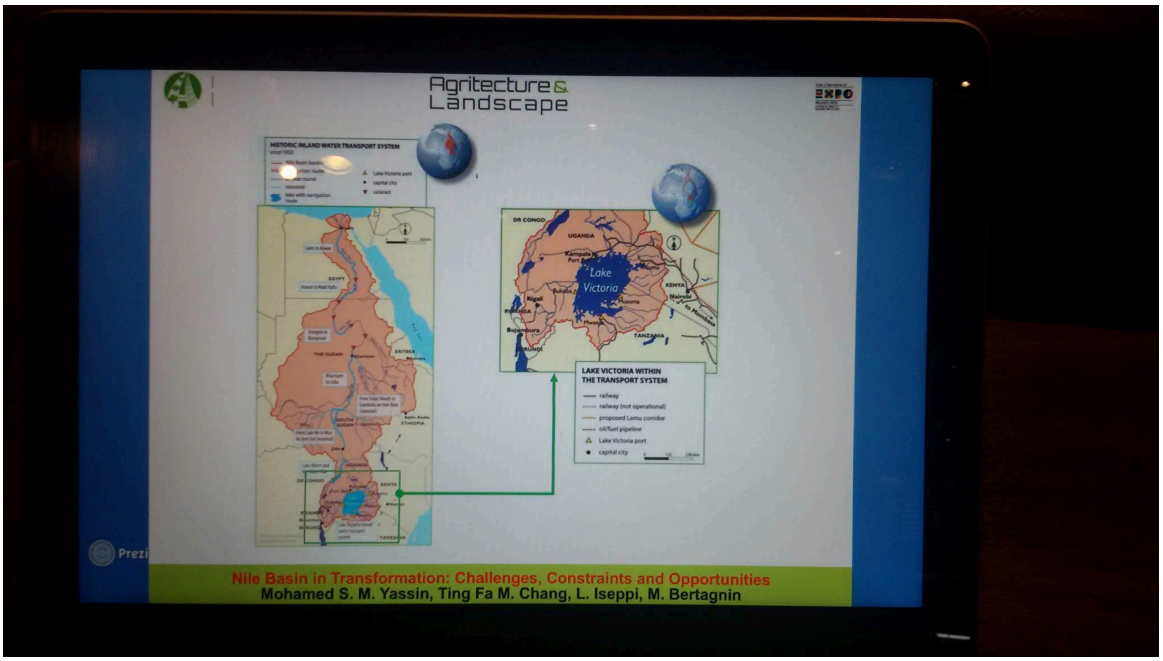


Figure 46**. Lake Victoria Basin in the Nile Basin System.**

Furthermore, the Sudanese food system along the Nile is taking similar shape when compared to that consolidated in Egypt. The small urban settlements, which were separated from each other along the shores or banks of the river, are joining one to the adjacent and continuing on an ever-blended urban-rural food system, where it is hard to distinguish the rural urban benchmarks. In all these cases, the spatial population distribution, markets and trade is influenced by the climate, rainfall, soil fertility, mineral resources, peace and security, social

and economic infrastructures such as transportation networks, education, health, telecommunications, hospitality and tourism facilities. However, the Nile Basin River system appear to be the driving factor attracting the formation of these human settlements, and forming the interdependent and interconnected city region food system.

5.2.5 Discussion

Previous studies have underlined how food systems will shape cities even more in the near future, and those constructive and dynamic interrelations are possible only with the preservation of the *informal* core of markets that can be assumed as key factors. Formless strategy provides another type of spatial order and connection between food and metropolis. It is Tsukiji, indeed, an example of large-scale food retailing that is able to promote a sustainable urban density, creating metropolitan revitalisation processes. Along the Nile Basin, generally the market and urban horizontal expansion are developed or sprawled in a sort of informal pattern dictated by the growing population and rural-urban, urban-urban exodus and to large scale urban sprawl.

Part of this chapter is a result of collaboration and brainstorming by M. Bertagnin, A. Covatta, M. S.M. Yassin

Chapter 6: The Nile Basin challenges and opportunities: Between transboundary cooperation and national territorial transformations:

6.1 Background

The Nile Basin is an extended unique and rich territory in the African continent, which extends over diverse climatic regimes. Currently, the Nile basin is hosting almost half billion inhabitants (more than 42% of the African total population) and projected to double its populations in a rapid pattern within this century to reach around half of the continent projected population. The Nile Basin is endowed with significant natural resources and considerable biodiversity heritage. The Nile Basin has been and continues to host important civilizations and natural biospheres. The current political composition of the Nile Basin is eleven sovereign riparian states, namely Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania and Uganda. Each of those riparian states has its own challenges and opportunities in terms of proper development, socioeconomic growth and prosperity. Ideally, each riparian state can address its own challenges and harvest its untapped opportunities, but in reality each one is interdependent and interconnected with the other adjacent or non-adjacent riparian states in a way or another.

The Nile River is the common binding natural resources for all that countries and historically has been a founding fountain of livelihood for all within the Nile Basin and continue to be an important connection with Mediterranean and Asian populations and rest of the world. These countries have embarked in international and transboundary cooperation and dialogue for the water management, usage and development through diverse fora such as the Nile Basin Initiative with its secretariat in Uganda, Entebbe and the subsidiary offices in Ethiopia, Addis Ababa and Rwanda, Kigali. However, most of those efforts were limited only on conflictive focus on the water in separation from the rest of the ecological base and foundation and the supplementary tangible and intangible resources necessary for sustaining a sustainable livelihood in a comprehensive setting. Historically the management of Nile Basin resources have been managed in cooperative and competitive styles depending on epochal phases.

In the contemporary situation, these riparian countries need to have cooperative and sound competitive concerted and coordinated actions. That is a must need to foster the socio-economic development and its sustainability. Of course, each riparian country needs to reconcile its developmental needs and priorities with that of sister riparian country. Any unilateral actions to exploit monopolize the sharable benefits from the River Nile and its ecosystems will results in harmful impacts and outcomes for the very and single actor. It will be impossible for a single riparian country to monopolize the benefits and have the lion share of the River Nile, what so ever it is, unless the riparian countries merge in single institutional body united under the Nile Basin, for example an imaginable and possible the Nile Basin Community. That unionistic and mutualistic transformation might results in more beneficial, supportive, consolidating and solidarity spirit among the integrateable territories of the Nile Basin. All the Nile Basin riparian states as the rest of the planet are facing the challenge of how to reconcile the sustainable development and prosperity with the nature conservations and environmental protection.

The cooperation, collaboration and coordination of the sustainable management of the Nile Basin territorial capital, goes beyond a mandate of single line ministry of irrigation and water resources. A shift to a more inclusive, comprehensive, holistic and participatory approaches are imperative needs for all the Nile Basin community and that shoulders huge responsibilities on those who are currently leading the policy making and formulating the regional planning for the populations of the Nile Basin. All the Nile Basin states have a non-disputable right to carry on its national and strategic developmental short, medium and long terms plans and visions. All are facing challenging and complex food and nutrition security issues dictated by limited resources and growing demography, environmental and climate related challenges coupled with undergoing processes of industrialization and exploitation of the natural endowments, conservation of heritage and erection of infrastructures to sustain the territorial, socio-economic transformation and political stability and dynamics.

If we consider the infrastructures for the hydropower production and distribution, irrigation and resource management needed to boost the sustainable development in the Blue and Eastern Nile countries, namely Egypt, Ethiopia, South Sudan and Sudan, comprehensively we can count around fifteen existing hydropower projects. With diverse developmental status among and within these four riparian countries, and if we go further deeper and extract the planned hydropower projects featuring in their national plans, we will notice that there are

around twenty five, more or less new hydropower projects to be erected (See attached maps of the Nile Basin Initiative) to guarantee power security and socio-economic development and stability.

The current disputes and conflictive atmosphere created upon the under construction Millennium or Great Ethiopian Renaissance Dam (GERD) is just one spot in the wider developmental scenario which will be witnessed in that Eastern Nile Region.

Figure 47**. The Greater Ethiopian Renaissance Dam under construction.**

18

Figure 48. **Natural Scene from the Nile Basin signaling the importance of nature conservation.**

Ethiopia is naturally gifted and endowed with considerable magnitude of water and high lands which qualify it to be an important Hydropower production hub, which can secure its energy needs and goes beyond to supply the region. At the same time, other parts of the region have its endowments which are not equally available among the Ethiopian natural capital and that could be compensate through analogues regional trade (Theory of comparative advantage and international trade can apply and fit the situation). Still Ethiopia has important biosphere reserve which add value to its potentially to be a hub for sustainable tourism, if well managed. These natural biosphere are UNESCO Biosphere Reserves.

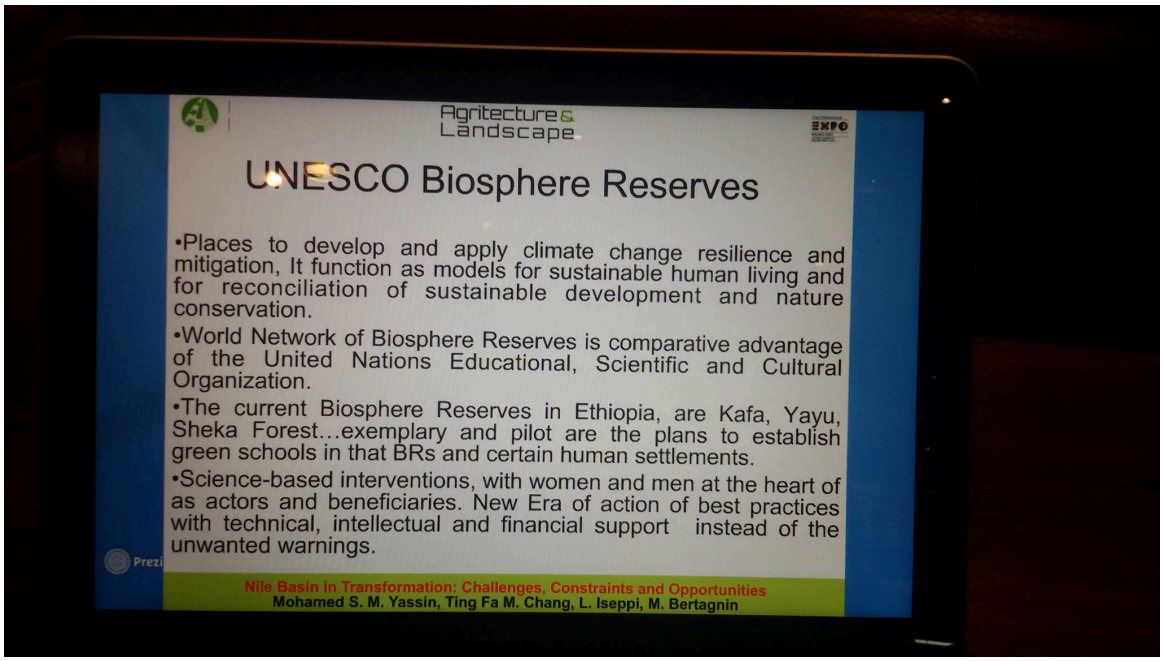


Figure 49**. UNESCO Biosphere Reserves in Ethiopia**

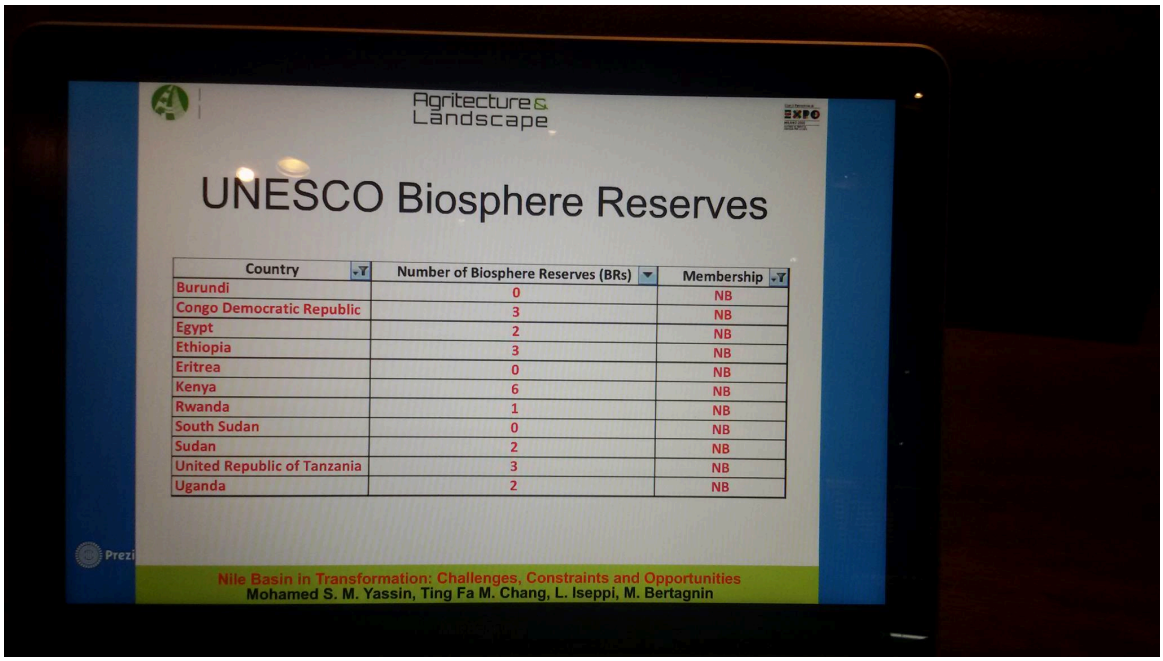


Figure 50**. UNESCO Biosphere Reserves in the Nile Basin**

The Nile Basin a whole is a unique territory endowed with wonderful landcape, that is clearly observed when the candidate travelled by road through out the basin, examples are reported below.

Landscape: Mobility from rural to urbanizing centers in Uganda – The main artilary road from Entebbe to Kampala, where urban sprawl is evident.

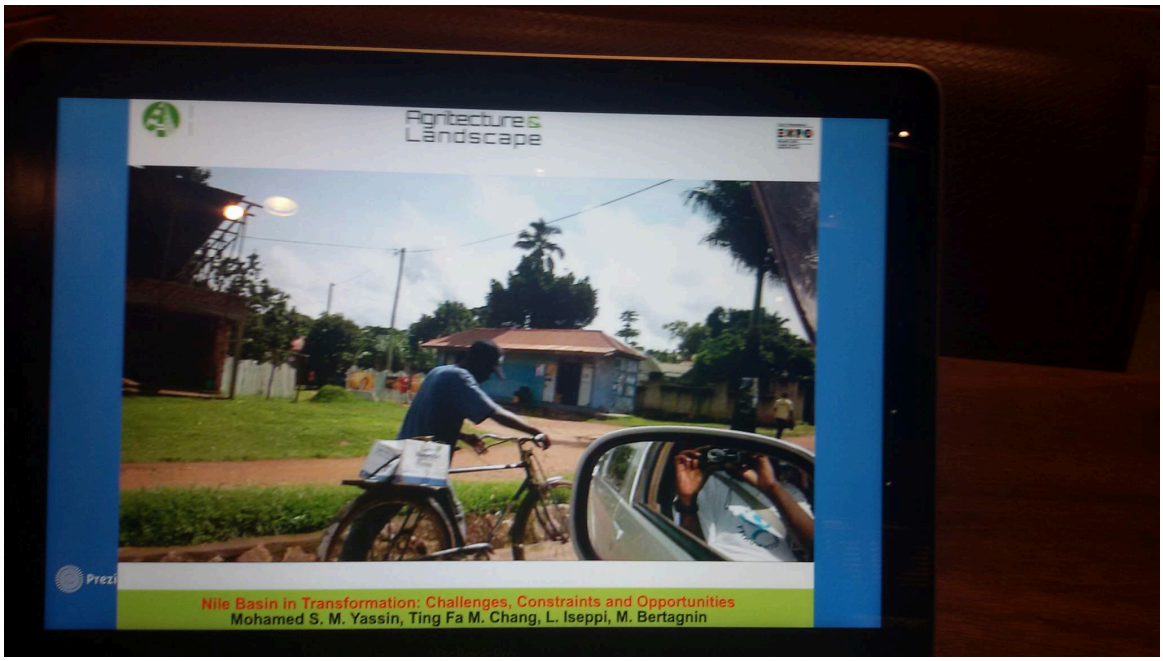


Figure 51**. Capturing landscapes from the Nile Basin, Uganda**

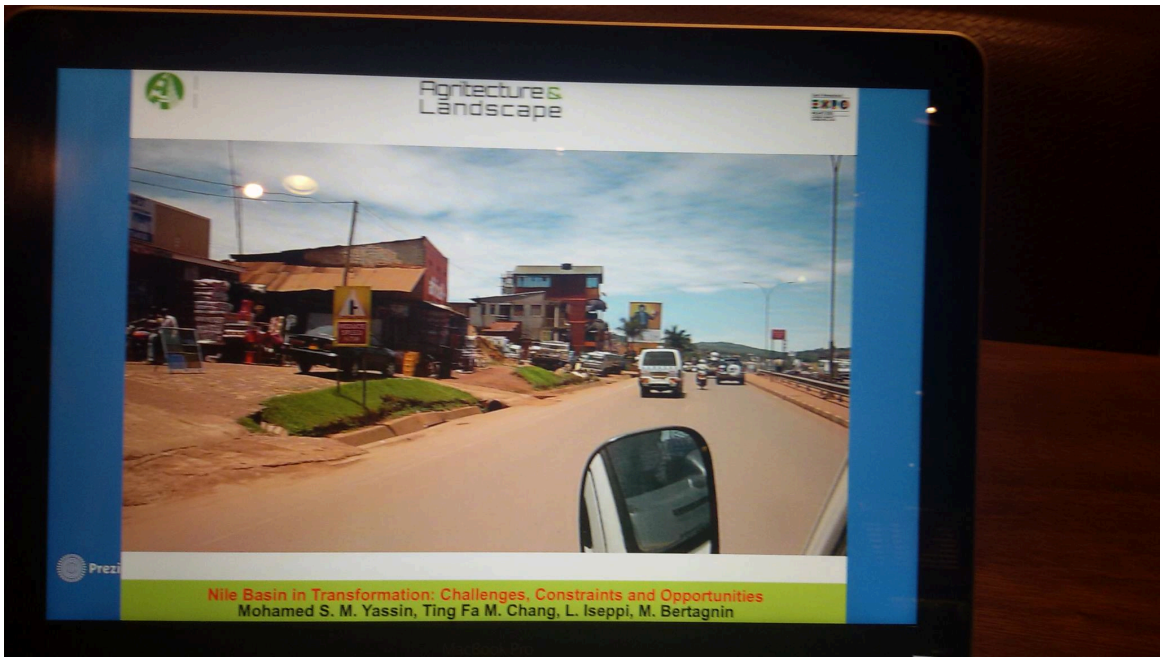


Figure 52**. Capturing landscapes from the Nile Basin, Uganda**

Figure 53**. Capturing landscapes from the Nile Basin, Uganda**

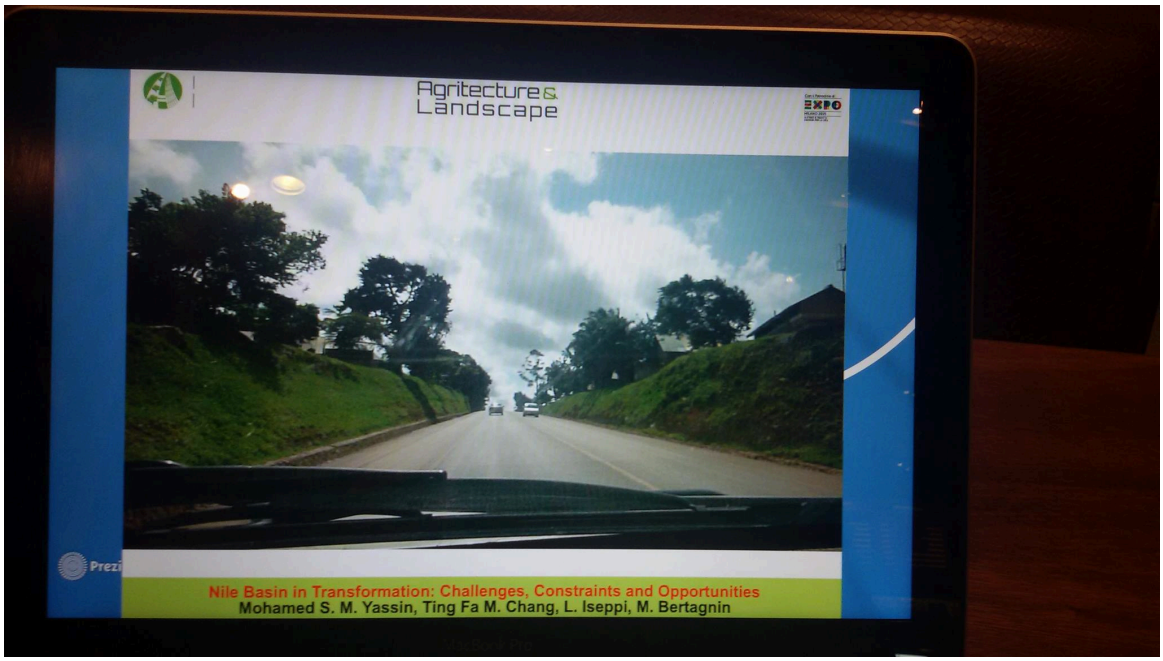


Figure 54**. Capturing landscapes from the Nile Basin, Uganda**

The candidate has captured more naturalistic scences and that will be published in a dedicated documentary.

If we consider the Newly independent republic of South Sudan, we notice that currently it has zero hydropower plant and in its national strategic plans, it is qualified to erect around four hydropower projects which are Fula, Shukoli, Lakki and Bedden, and Sudan has plans to erect numerous new dams in addition to the newly terminated Morowe dam, these are Dal Low and Dal High, Kagbar, Dagash, Shereik and Sabaloka dams.

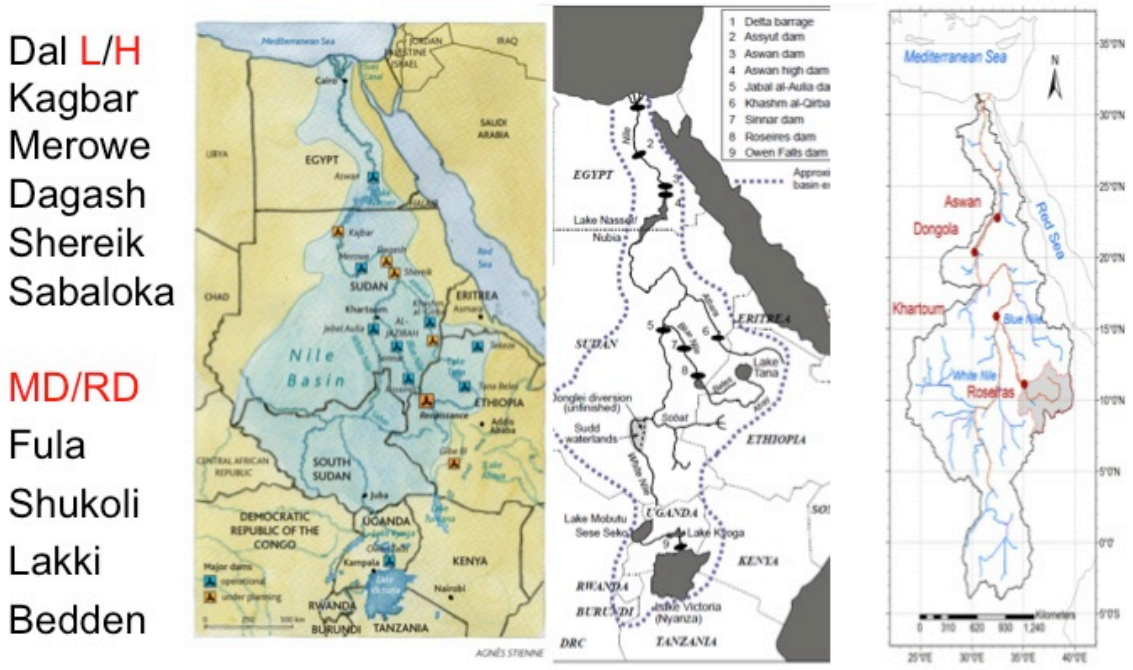


Figure 55**. Some planned Dams along the Nile Basin in Sudan and South Sudan**

While Egypt has a planned new dam in its national pipeline foreseen to be at Assiut /Asyut. Doubtless, the erection of all that planned hydropower plants and projects along the whole and enire Nile Basin Territories will have huge socio-economic, environmental, ecological, landscape and territorial transformations and impacts, negative be it or positive. Surely that makes the cooperation among these directly engaged riparian countries as well as the rest of the Nile Basin Countries a non-escapable necessity.

The future scenarios require frank dialogue and courageous confrontations putting a Nile Basin integrated community as top priority to address the current and latent challenges and at the same time work collectively to share the potential benefits of the expected positive and contractive transformation.

6.2 The Great Ethiopian Renaisance Dam (GERD)

In this part, an attempt of quick analysis of the tripartite agreement of the East Nile Basin countries Egypt, Ethiopia and Sudan on The Great Ethiopian Renaissance Dam (GERD) is carried out. Without seeing what the tripartite agreement has stated. One can assume that it based on the internationally recognized principles of transboundary water resource management. The current major governance treaties of the Nile Basin concerning these three states are the 1929 and 1959 treaties.. without considering the under negotiation Cooperation Framework Agreement CFA....these internationally recognizable treaties normally incorporate several internationally recognized transboundary water resources management principles ranging from the principle of equitable and reasonable utilization, an obligation not to cause significant harm, principle of cooperation, information exchange, notification, consultation and peaceful settlement of disputes, and moreover the newly adopted principle of benefit sharing instead of water sharing as per se. These principles generally are fundamental for establishing solid foundation and common ground to plan and promote a sustainable development, which is mainly branched in social equity, economic viability, and environmental protection, on basin-wide dimension in our East Basin case.

The Declaration of Principles on the Great Ethiopian Renaissance Dam is an important step, which was supposed to be signed before the erection of the dam, not while the project is at its implementation of almost 50 %. In any case, it is good that Egypt and Sudan came to the cooperation track under the international cooperation and development umbrella. The right of the other Nile Basin states in sustainable development and fair exploitation of their resources remain as one of the major stakes for all without privilege, however, remain the dilemma on the will of Egypt and Sudan join the Cooperation Framework Agreement? This remains also an issue to be cleared and will appear readable once this declaration of principles is made public and embark the implementation stages. Let us bear in mind that there will be other 25 new dams to be erected along the Nile Basin.

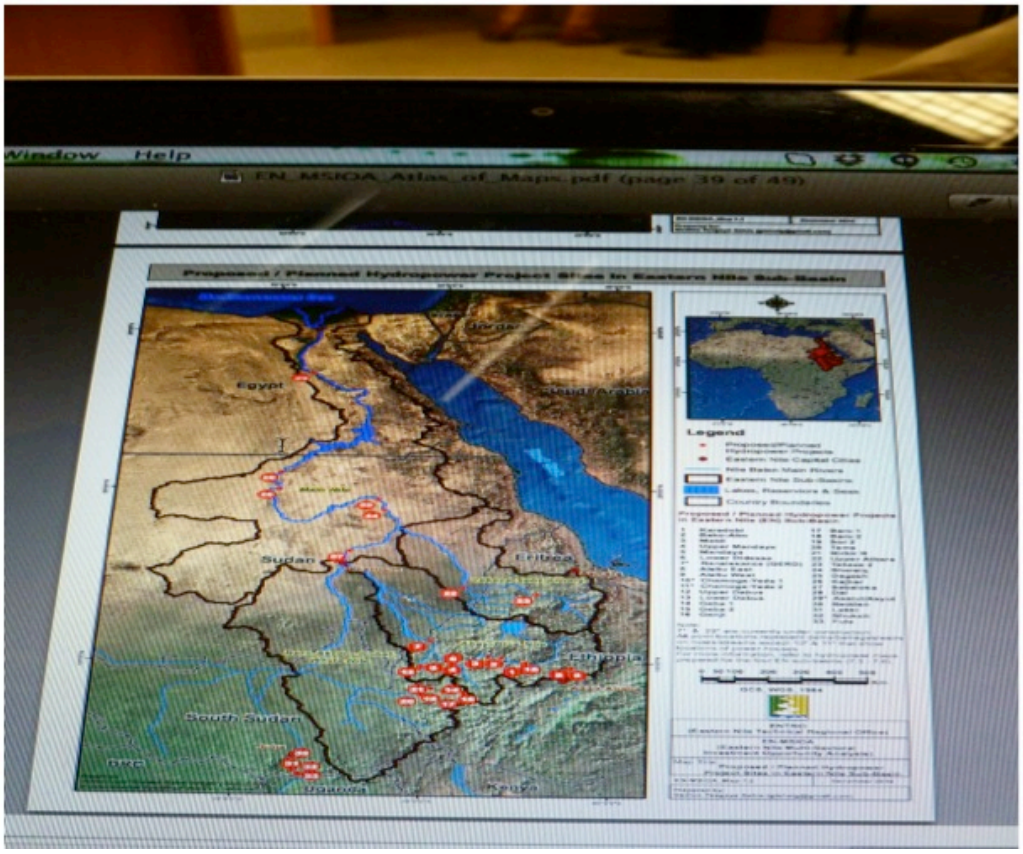


Figure 56. The planned Hydro-power plants along the Nile Basin

Source: Author Elaboration from the Nile Basin Initiative (NBI) 2015

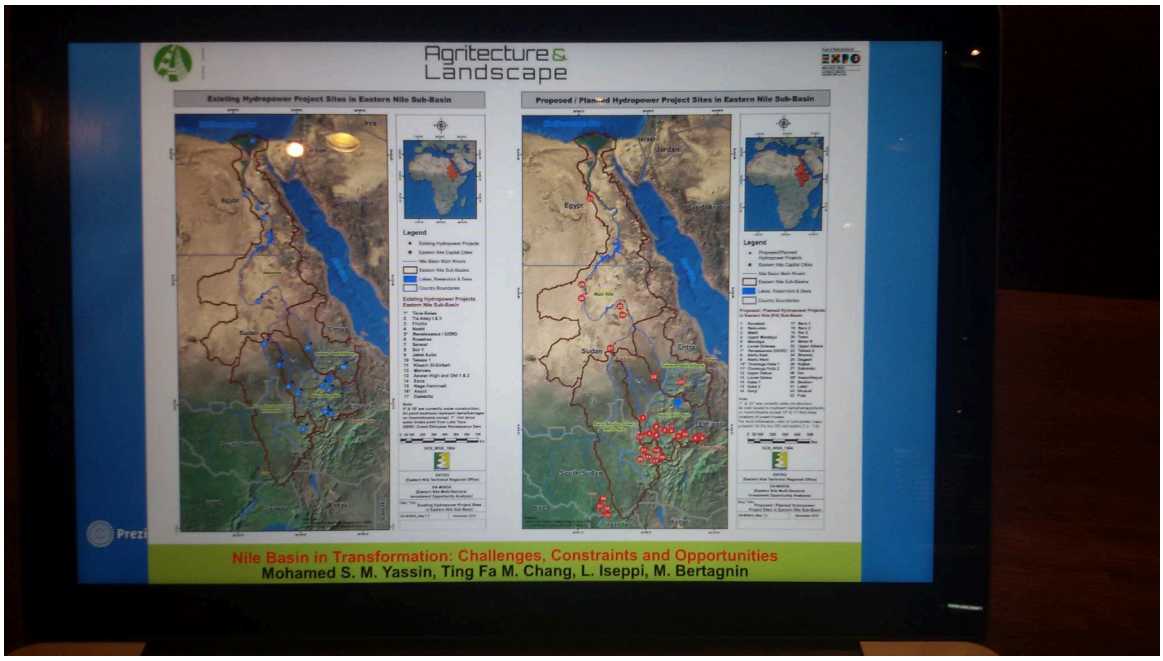


Figure 57. The Exisiting and planned Hydro-power plants along the Nile Basin

Source: Author Elaboration from the Nile Basin Initiative (NBI) 2015

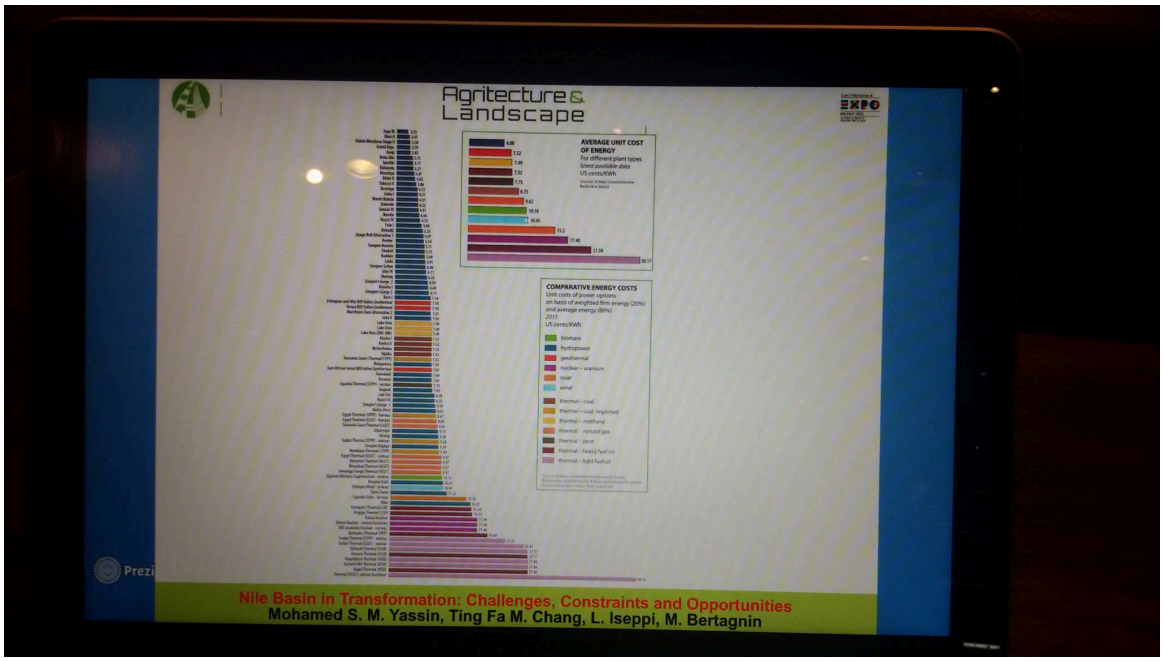


Figure 58. The Hydro-power plants along the Nile Basin

Source: Author Elaboration from the Nile Basin Initiative (NBI) state of the River Nile

In particular, South Sudan as a newly born state within the Nile Basin has no any dam for hydropower generation, and it is in deadly and bad need to have such energy security....in addition to that the other Nile Basin states have also the due rights to its sustainable development and energy security which requires also major exploitation of the available resource of which the Nile River is essential.

This declaration of principle on the GERD is said to contain mainly 10 basic principles which are common for most of the trans-boundary river basins.. etc and the challenge remain in the interpretation and quantification of the needs and the realistic deeds....now Egypt is justifying its vital need for more than the 55.5 BCM of water, as historic right, which is a complex issue, not fully sharable with the rest of the Nile Basin partners....that necessity is critical due to the demographic steady growth of Egypt. This demographic challenge is also the case of the rest of the Nile basin countries, which are currently have population totaling more than 560 million inhabitant and projected to reach around 880 million in this century.

Doubtless, this renaissance dam will boost the economic growth and energy security for Ethiopia and the region as it is claimed, and it will jeopardize the functioning of the currently erected dams along the path of the Nile, in addition to that, the socio-economic impacts of this huge infrastructural opera coupled with the expected environmental and ecological alteration will be of huge implications. Negative impacts and implications to be mitigated and adapted for and positive counter and outweighing impacts and implications which are to be harnessed and benefited from in a basin-wide vision.

Worth to mention that the some people inhibiting the Blue Nile Region of Sudan have mentioned that they were held obscured and were not raised participant in these important negotiations, which will have huge implications on their livelihood. And they have mentioned that they will have their say when it is appropriate. The lack participatory approach and lack of transparency are characterizing this declaration of principles.

Once this declaration of principles is revealed to the public, all stakeholders are expected react and will come back to it for deep and detailed discussions and consensus building.

Realized all the planned dams along the Nile Basin, the Nile river would likely turn from a natural river to a regulated River, and that requires coordination based on mutual cooperation.

An important question posed concerning the environmental and socio-economic impacts following the realization of the planned dams. Yet, there are no clear answers to clarify the impacts and implications. Currently the water flow of the Nile Basin river system is illustrated in the following figures

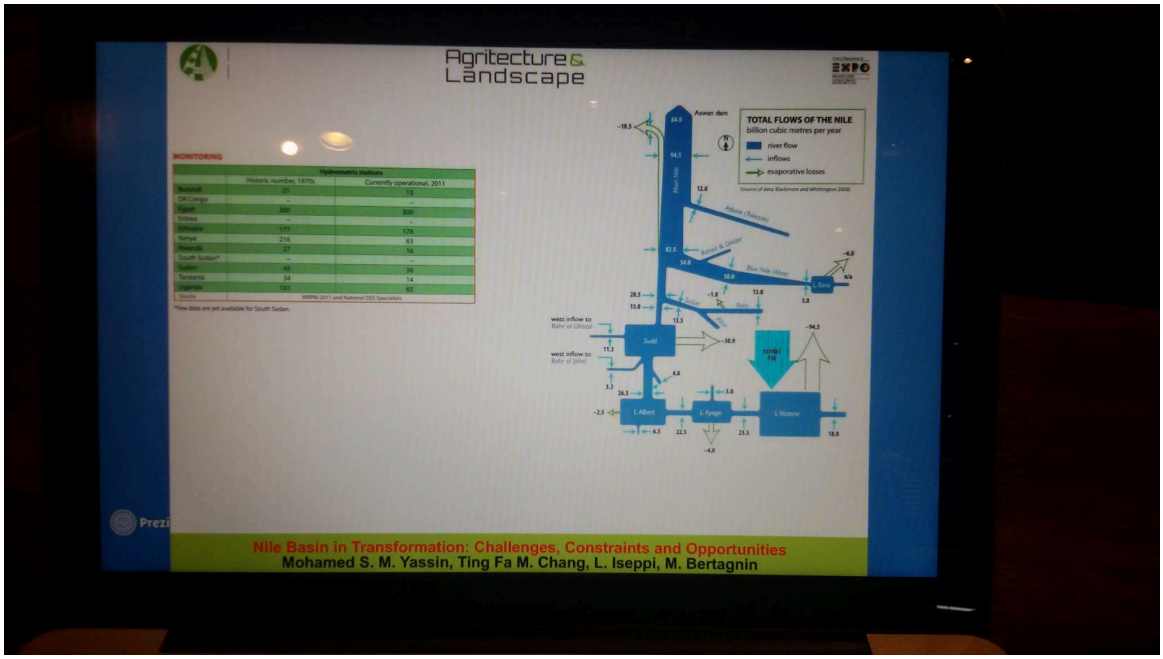


Figure 59**. Water Flows of the Nile**

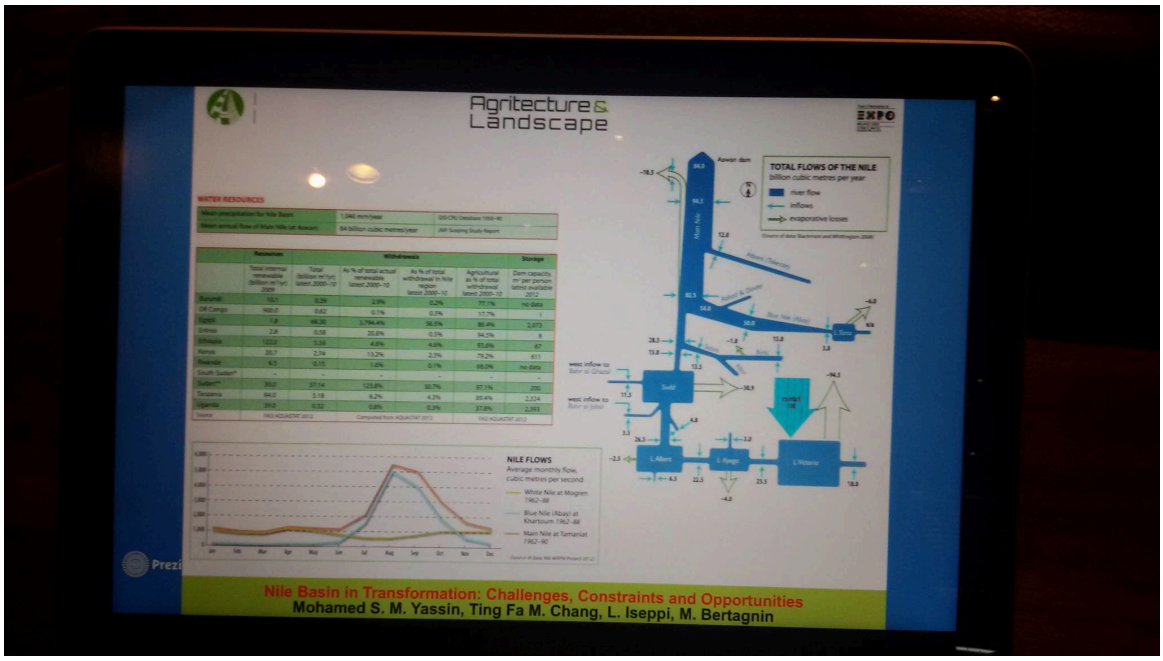


Figure 60**. Water Flows of the Nile and Annual Rainfall distribution**

6.3 The Nile Basin in Transformation: Research uptake and what's at stake?

The Nile basin territories have witnessed huge transformation since prehistoric era and continue to be subjected to enormous transformations. The transformations along the Nile basin territory constitute substantial challenges and are governed by significant constraints and thus triggering the potential opportunities that directly affect the livelihood of the Nile basin growing and urbanizing population. The multiplicity and the complexity of the transformormational and developmental pathways pose imperative transboundary cooperation in order to address the current and future pathways presenting and needed for the prosperity of the Nile Basin population; that requires innovative cooperative and collaborative platforms and fora which should engage multistakeholders, without exclusion of interested parties, including policy-and-decision-makers, academics, public and private sector actors, civil and community based organizations, local and regional governments and institutions from the Nile Basin and beyond the Basin. These physical and virtual gatherings should frankly, critically and analytically tackle the issues at stake of the Nile Basin in transparent and scientific manners aiming to a real shared benefit for the collective communities of the Nile Basin. The Nile basin policies, programs and projects must be subject to consensual deliberations by the vast majorities of the Nile Basin communities to ensure equitable and sustainable prosperity for all those who entitled to equal rights on sustainable development

and mutually beneficial relations with the Nile Basin territorial capital. The Nile Basin community will increasingly face challenges of food and nutrition security for its expected billion inhabitants, coupled with environmental and ecological challenges due to the progressive socio-economic development and infrastructural erections, particularly the macro-hydropower plants and numerous dams expected along all the Nile Basin without transboundary shared visions especially when dealing with the post-interventional stages, challenges associated with the food wastages, urban solid and liquid waste and sewerage and its recycling and treatment, challenges associated with the internal displacements and regional migrations stimulated by man-made conflicts and natural hazards and disasters, challenges tied to political instability and competition over the scarce resources along the Basin especially on the ecological foundation, challenges of the ever-growing climate fluctuations, variations and change almost affecting the entire planet and consequently impacting the entire Nile Basin, challenges linked to the progressive pace and race on ensuring renewable energy and water security efforts by single states and foreign exploitative investors, challenges of non-sustainable patterns of productions and consumptions of resources and obsolete forms of colluded managements, challenges related to the missed opportunities of achieving the millennium development goals and the currently running sustainable development goals, challenges associated with the lack of financing a Nile-Basin-wide sustainable development and lack of reliable financial institutions to stimulate bankable projects and programs, challenges due to the absence of modern shared compacts and legal framework for a Nile Basin communities governance systems regarding the transboundary river systems.

In summary, this contribution intends to highlight and bring insights and research findings regarding multiplicity of interconnected and interdependent challenges and potential opportunities concerning the current and future generations of the Nile Basin Communities illustrated through different methodologies ranging from conventional data collection and literature review to the innovative documentary digital semi-structured interviews and direct observations from the Nile basin territories. It stresses that the Nile Basin is mainly water, but not merely. It brings critical issues on the resources management, human rights and the right to development along the Nile Basin characterized with diversity of approaches and policy orientations. It pose the question on what will be the scenario when the Nile Basin and its river systems become coordinated and not anymore natural systems and how can the

reconciliations between nature and the sustainable development paths might be shaped or cooperatively governed especially on a prospective of urban growing agriculture and trends of industrialization. Lastly but not least, it emphasise the importance of the Nile Basin heritage conservation coupled with the socio-economic and infrastructural development.

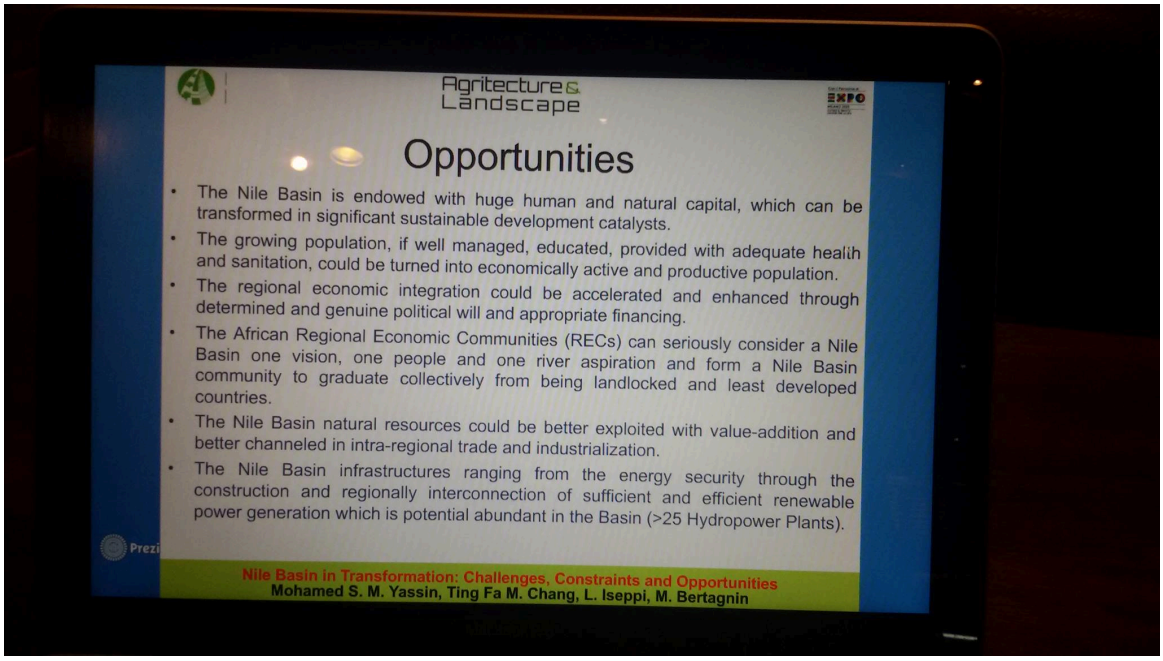


Figure 61**. Some Nile Basin opportunities**

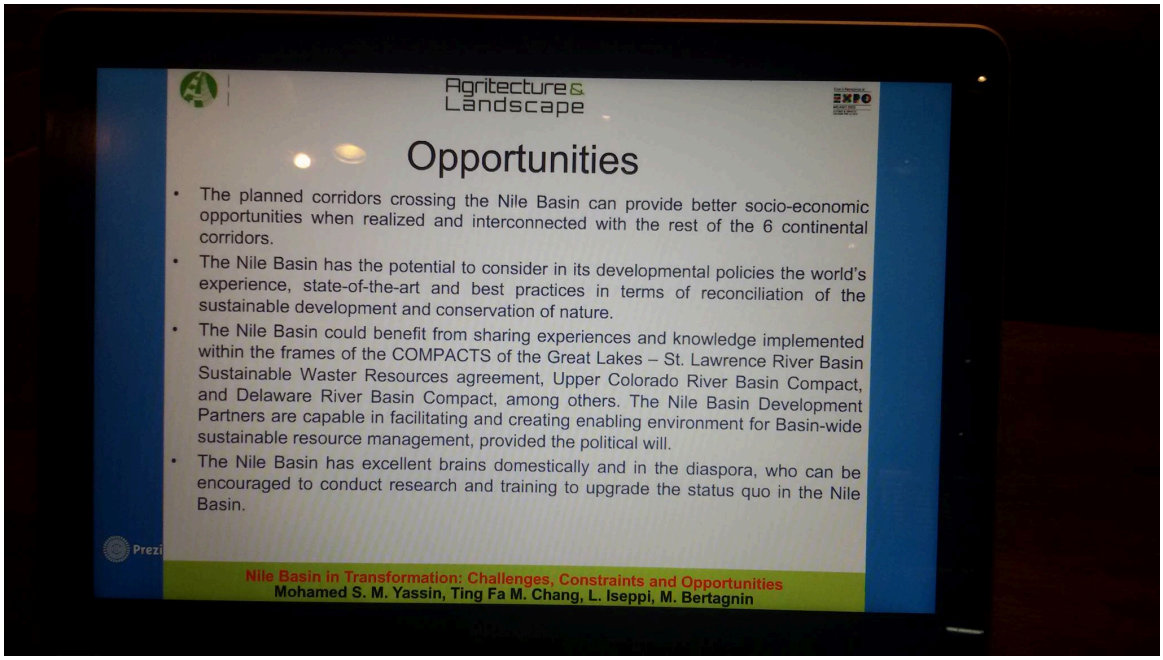


Figure 62**. Some Nile Basin opportunities**

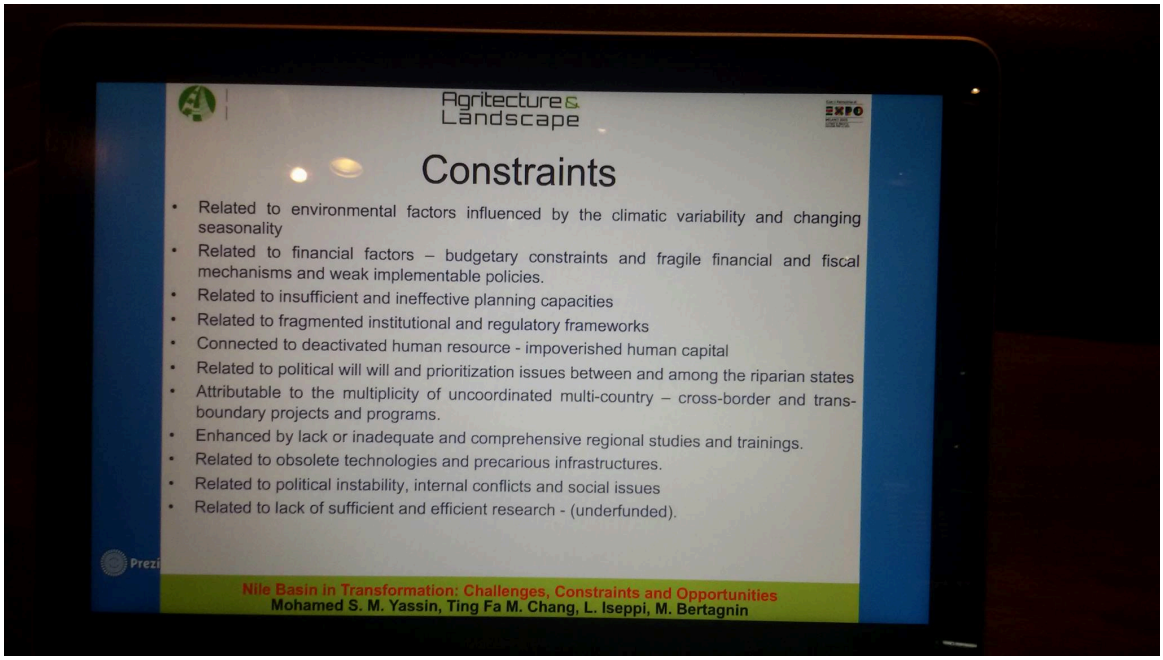


Figure 63**. Some Nile Basin constraints**

As the serendipity is the occurrence and development of events by chance in a happy or beneficial way, I would like to mention that my engagement in this research doctorate program was as such event occurred during a kind invitation for lunch by Professor Vasco Boatto with Professor Margherita Ting Fa Chang, and I am glad that I have taken the challenge and competed in the admission exams to this unique and important multi-discplinary challenging research doctorate and unique program and I am feeling that I am bringing it to the shores hoping to have done a mutually beneficial achievement, not only for me but to all those who backstopped me and continue to do support me for future research.

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- https://youtu.be/o29x71Gt7sg
- https://youtu.be/0PnFTxngMZU
- https://youtu.be/BJNkUF2irtM
- https://youtu.be/-Cb_aW2C2O8
- https://dniafryki.olsztyn.pl/wp-content/uploads/2014/05/Program-Dni-Afryki-2015.pdf
- http://www.paysage.it/images/network/Programma%20Agritecture%20Landscape.pdf
- http://nai.uu.se/Draft_Agenda_Wad_Medani_251120162.pdf
-

Annex 1: Some Photos extracted from the conducted interviews

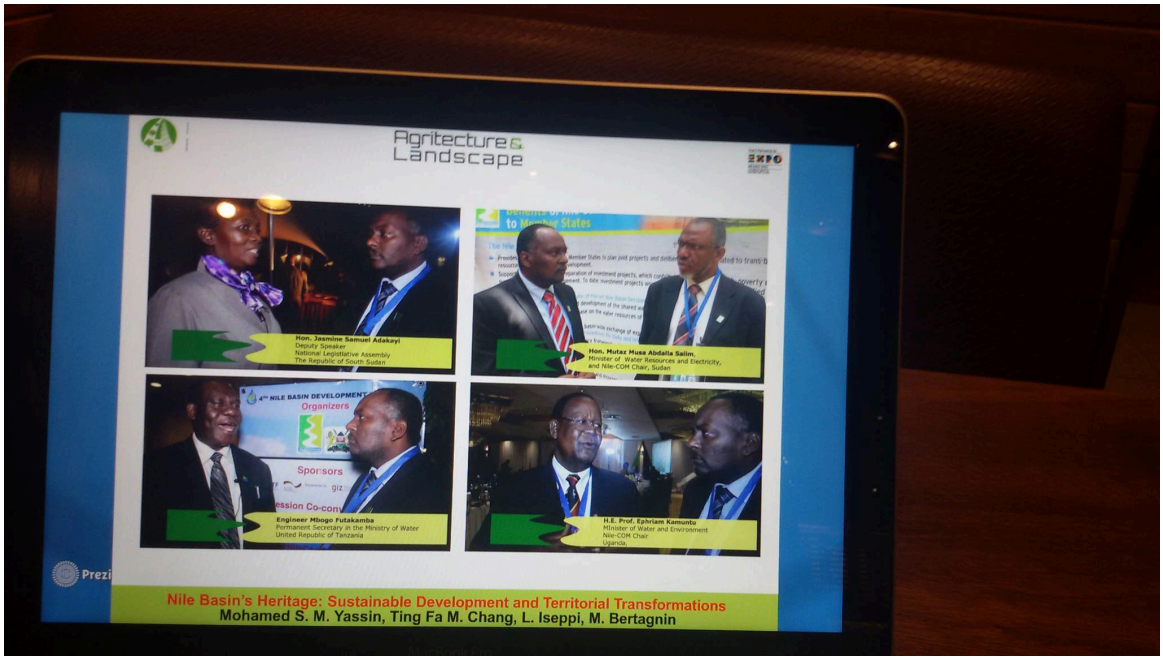

Figure 64. **Interviews conducted with Nile Basin Stakeholders**

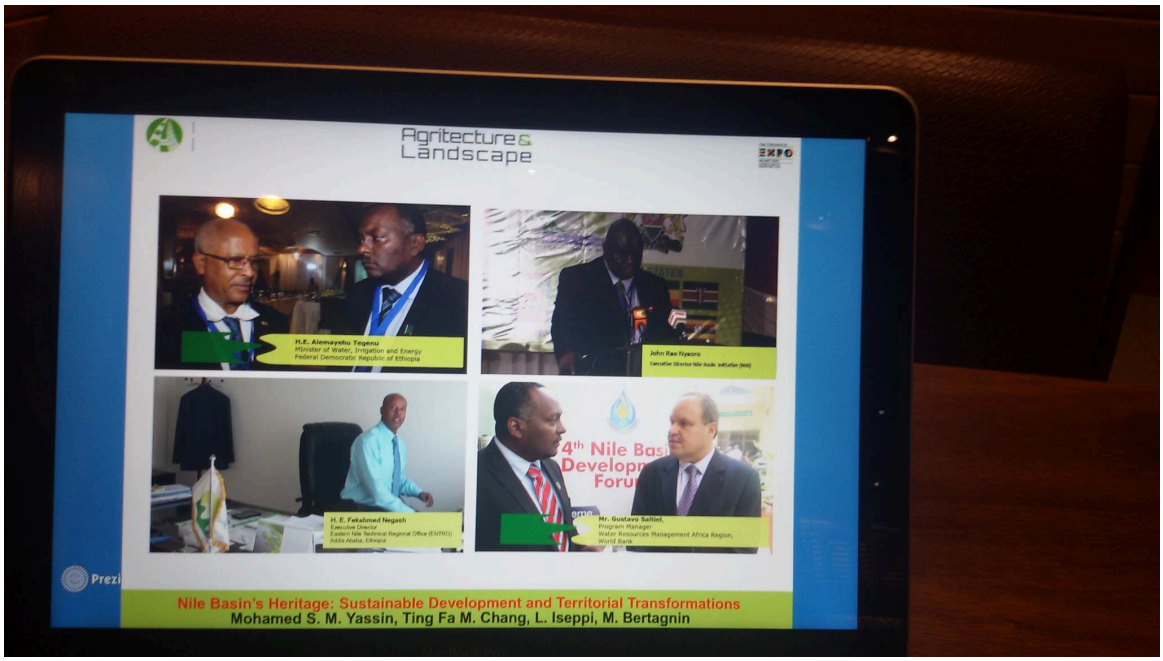

Figure 65. **Interviews conducted with Nile Basin Stakeholders**

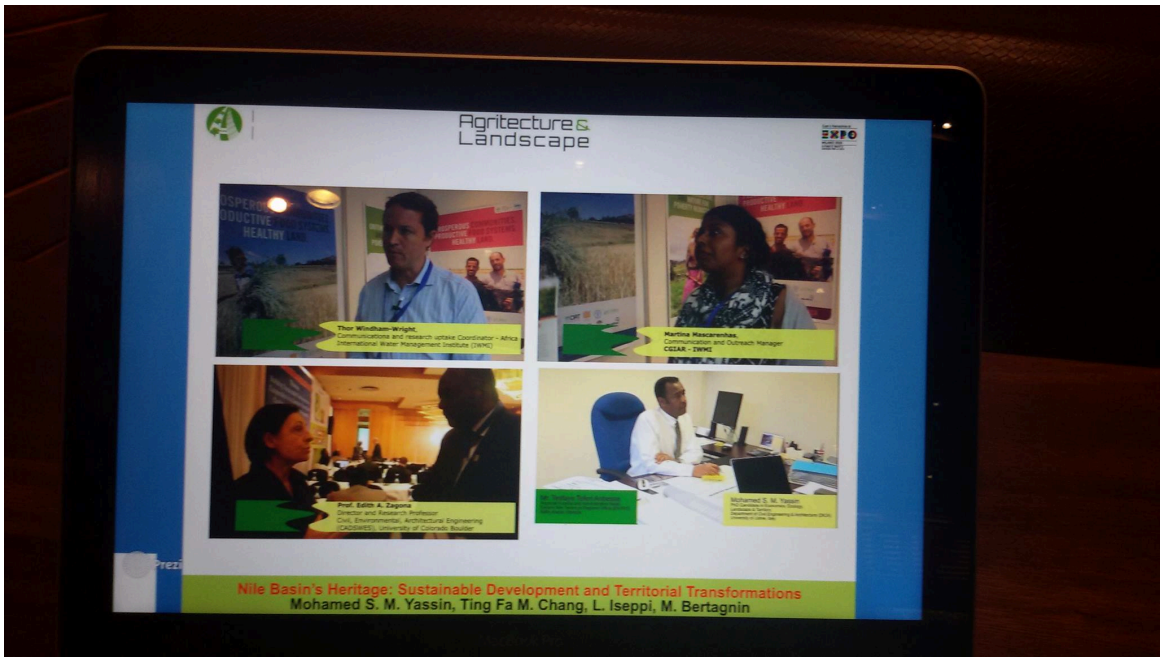

Figure 66. **Interviews conducted with Nile Basin Stakeholders**

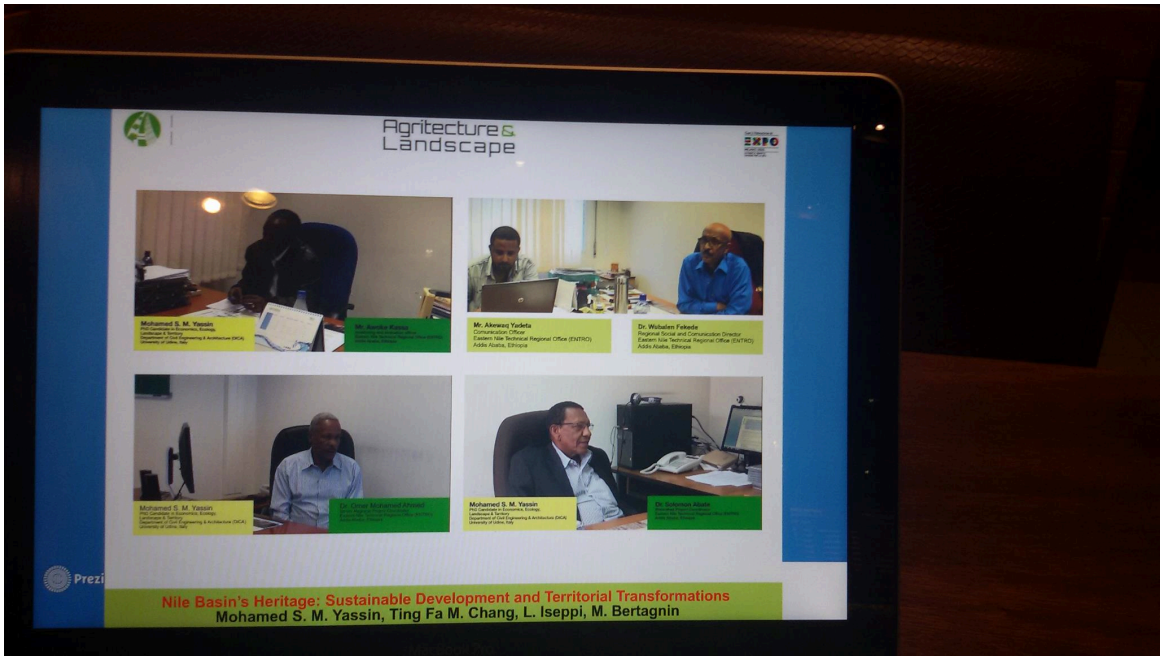

Figure 67. **Interviews conducted with Nile Basin Stakeholders**

Figure 68. **Interviews conducted with Nile Basin Stakeholders**