Defining the Major Technological, Natural Resource and Environment (NR&E), Socio-Economic, Policy and Institutional Constraints to Agriculture, Forestry and Fisheries Development and Sustainability in Eastern and Southern Africa

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I. Natural Resources and Environmental (NR&E) Constraints:

- Continued unchecked population growth, coupled to limited economic development, policy support (including unstable tenancy arrangements) and livelihood options will continue to exacerbate the fragmentation of land holdings in highland areas elevating pressure on resources and resulting in worsening land/resource degradation and water scarcity. This will spread into adjacent lowland and marginal areas as well.
- Continued unchecked disturbance of high mountain forests and water courses, global warming, and limited investments in conservation measures and maintenance of land cover will result in large scale negative off-site effects, such as water scarcity and sediment loads, to large areas.
- Continued unchecked destruction of habitats of wild species and of unique mountain ecosystems caused by encroachment on wetlands, forested and protected areas, through burning, and through elimination of micro-habitats within agricultural lands will lead to an unrecoverable loss in biodiversity.
- Soil nutrient depletion coupled with the inability to replenish nutrients, limited investment in resource maintenance and to associated increase of pests and diseases related to soil productivity decline will continue to drive yields down exacerbating poverty and quality of life in the very small farms of the highly populated areas.
- Increased pressure on water and land resources will result in more conflicts, theft and disturbance unless traditional or other strong, local stewardship and collective management systems are facilitated and supported.
- Poor public and private service provision, education (literacy levels) and infrastructure due to limited investment in mountain areas seriously limits access to information, credit, inputs, markets, which in turn limits investment in natural resource management.
- The unique, diverse African cultures, religions, and identity associated with mountain areas are negatively transformed by development, loosing unique traditions, values, norms and peoples.
- The fragility and heterogeneity of mountain areas, the complex problem sets (as indicated in the bullets above) and limited institutional, policy, and economic integration, coordination and cooperation will result in a threatened ecosystem and exacerbated poverty.
- Limited local capacity and facilitation to build capacity, isolation of local highland populations, continued reliance on super-structures and external donors

will undermine the grassroots ability to demand services, solve their own problems, advocate for their rights, and take custodianship of the landscape, the culture and of livelihood improvement.

- Limited cooperation of governments, policy makers and R&D institutions working across borders leaves complex NRM problems originating in mountain areas unanswered, limits impact, and creates conflicts and undo competition for resources among organizations and governments.
- Cross-border conflicts arise over water and siltation, and other ecosystems are threatened due to limited solutions and limited resources invested in upland resource conservation.
- Global concerns on biodiversity conservation take precedence over local interests, while local interests continue to erode biodiversity due to lack of livelihood options and conducive, incentive policies and economic conditions that support alternatives.
- Unchecked land and resource degradation, limited economic growth and investment in highland areas exacerbate cross-border migration and results in increased insecurity, urbanization and worsening poverty.
- Mountain areas remain isolated, with limited investment in infrastructure, and regional trade barriers limit development of new markets, reduce the ability to locally reinvest in maintenance of the resource base, and the downward spiral continues downward.
- Limited regional cooperation and integration reduces the opportunity to work locally, to share different solutions to common problems regionally, and to share the synthesis globally and back to local.
- Governments remain isolationist, unstable, corrupt and conflict-oriented which removes desire and ability to collaborate to solve cross-border problems and to form a united front to the rest of the world, representing Africa's interests and needs.
- Past efforts in land and water management and conservation in most of the countries have not produced the expected results, mainly because:
    - ♦ They were mostly *ad hoc* and not well integrated to ensure sustainability,
    - ♦ They were characterized by sectoral approaches and were not under-pined
    - ♦ by relevant research,
    - ♦ They did not pay enough attention to socio-economic aspects, and
    - ♦ They did not facilitate ownership by local stakeholders.

- Consequently, land degradation especially through soil erosion is accelerating in many countries, causing adverse environmental impacts.
- Declining soil fertility has been recognized to be a major constraint to agricultural productivity in all countries of ECA. At the same time the rate of use of inorganic fertilizers is abysmal as a result of a vicious circle of high prices, low demand, and poor distribution systems.
- Due to inadequate plant nutrient management, nutrients are effectively being mined from cultivated lands in most farming systems in the ECA countries.
- Land and water resources available for agricultural activities are becoming scarce in most of the countries. Agriculture is required to produce more with less land and water resources.
- Water availability in nearly all countries is highly dependent on rains and thus highly variable in amount, timing and from one place to another.
- At the same time irrigation schemes and infrastructure developed using public resources have become no-profitable and obsolete in most countries.

Climate change

- While the question of global warming and climate change is still a point of debate, the scientific evidence of human-induced global warming is unequivocal. Enough evidence is accumulated to show that the last 100 years have been the warmest on record. The global temperatures are predicted to increase by 1.4 – 5.8^{o}C by 2100. According to the IPCC, the main challenges facing Africa will emanate from tropical storms, floods, droughts, landslides, abnormal sea-level rises, and other extreme weather expected as a result of climate change. There is a need to consider the changes predicted for the region and their consequences on agricultural production and productivity.
- The most important constraint climate change understanding and management is related to poor quality of data. Meteorological and hydrological data are inadequate in terms of coverage and quality and access. Even today the region agricultural production is suffering from extreme events of floods and droughts. It would be important for SWMnet to be aware of the threat of climate variability and change as it has or will have profound effects on water and land availability for agriculture in the region. Furthermore, land and water management itself may reduce or magnify the effects of extreme climatic conditions. Reduction of these effects will therefore be one indicator of impact of soil and water management technologies.

Water scarcity

- Studies by IWMI have projected that about a third of the world population will face critical water scarcity problems by year 2025. As the water scarcity increases, more water will be diverted to meet the demands from other sectors at the expense of agriculture. To maintain the production at the levels required to ensure economic and social development in ECA, there is a need to increase effectiveness and productivity of water in agriculture. This will form part of the core activities of SWMnet.

Land degradation

- Rapid degradation of the productive potential of the natural resource base through decline of soil fertility, development of acidity, salinization, alkalization, deterioration of soil structure, accelerated wind and water erosion, and loss of organic matter is a major concern as the restoration of is expensive and in some instances the degradation is irreversible. Further, farmers are increasingly cultivating marginal lands susceptible to various forms of degradation. Furthermore as mentioned above, land and water degradation increases the effects of extreme climatic events linked to climate variability and change. Strategies to develop appropriate technologies that address the needs of the less favorable environments and arrest land degradation are required. This will also form part of the core focus for SWMnet.

Economic, social and political issues

- Globalization and open market system are expected to continue to influence agricultural development in developing countries in the coming years. Lower tariffs, reduced subsidies for inputs such as fertilizers, water and electricity and rational commodity marketing driven by world prices put pressure on the farmers from developing countries to improve the productivity and efficiency.
- Stagnant or even negative economic and social development in the region is a major threat to land and water management and conservation. In turn, the unsustainable use of natural resources impact negatively on development, thus creating a vicious circle of poverty – degradation – poverty.
- Another threat or constraint emanates from mismatch between water basins/catchments, political and socio-economic boundaries, ecological and climatic zones. There are growing conflicts of up-stream and down-stream stakeholders – in-country and among riparian countries. This is made worse by lack of agreements, political will or policies to co-manage and coordinate on trans-boundary waters.

Natural Resource Management

- Land tenure
- Water access and quality, basic utilities such as water sewage system
- Over exploitations (land, fisheries coupled with wastes hazards, chemicals,)
- Trans-boundary environmental problems
- Lack of community management systems for access to natural resource management
- Institutional arrangements for effectiveness and efficiency
- Lack of appropriate integration of technological solutions
- Inadequate participation by the beneficaory in identification and implementation

Genetic Resources

- Policy environment is incomplete
- Lack of dialogue

- Erosion of genetic resource base
- Not a dynamic processes of harmonization
- Lack of willingness to share genetic resources

Biotechnology

- Reluctance of government in giving directions or communication
- Lack of awareness
- Inadequate skills and knowledge base
- Food biotechnology GMOs
- Consumer interests are not met
- Multi-national inappropriate communication strategies, lack of communication strategies to introduce new technologies
- Risks in environment, health
- Biotechnology is very expensive

II. Socio-Economics and Policy Constraints:

- ***Population growth rates:*** According to IFPRI estimates of 2.5 percent, the region has the highest population growth rate of any developing region, although this slowed down a bit from 2.8 percent in the late 1970s. Two-thirds of the regional (Africa) population of 600 million now resides in rural areas and urban population growth is soaring with the number of urban residents projected to exceed the rural population by 2030 due to outflow from rural areas. A the same time, the population segment over 65 is growing - - making the demographic trend one of urbanizing and aging! Agricultural growth in the region registered only 2.7 percent per year between 1990 and 1997 against a population growth rate of between 2.5 percent and 2.8 percent per year. This means that there was virtually no growth in per capita terms.

- ***Food insecurity:*** Around half of the region's population (302 million) lives on less than US$ 1 per day (up from 217 million a decade ago). In addition, 80 percent lives on less than US$ 2 per day. The number of food insecure people has also more than doubled to 194 million over the past decade while child malnutrition has doubled since 1970 and is expected to worsen by 20% under optimistic assumptions. In fact this is the only region of the world where the per capita consumption of food is on the decline. The rate of growth in cereal and meat production over the next 20 years is projected to slow and will not keep pace with demand. The World Bank projects that poverty will increase by between 20-40 percent by 2015.

- ***Human diseases:*** Although estimates show that malaria is still killer number one in Africa, HIV/AIDS is also taking its toll on the most productive population of the region. An estimated 7 million agricultural workers have died

since 1985, while another 16 million deaths are likely to occur within the next 20 years.

- ***Natural resource degradation:*** Agricultural productivity is hindered by the proximate causes of land degradation which include farming on steep slopes, limited fallow or vegetative cover, deforestation, overgrazing of rangeland and low levels of use of both organic and inorganic inputs. Soil nutrient losses in many parts of the region are among the highest in the developing world.

- It was reported by IFPRI that between 1940S and 1990, 65 percent of Africa's land was degraded to varying degrees, while 0.7-0.8 percent of the forest cover disappears annually.

- It has also been noted that land degradation and unsustainable use of natural resources are limiting the potential for agricultural development in the region. Growing populations and continued low levels of input use is exacerbating problem.

- ***High incidence of conflict in the region:*** The listing of challenges and threats for the region will be incomplete if the high incidence of conflict in the region is left out. In 1999, 14 African countries were engulfed in conflict, generating 18 million refugees, disrupting agricultural production and food security. ASARECA NARS countries claim a significant share of this influx.

- Declining development assistance and share of agriculture in that assistance
- Unfair global markets—subsidies and various trade barriers in developed countries (US and Europe)
- Agriculture's inability to compete directly with other sectors in public finance prioritizing
- High levels of dependence on external funds => imposed policies
- Larger number of actors in development policy with little coordination
- Limited macro economic/financial integration
- Lack of regional/sub-regional policy on key issues (IP, standards, etc.) => standards being set by developed countries
- Limited information flows across countries
- Poor infrastructure
- Poorly integrated/harmonized policies
- Poorly defined structures and processes for procurement of goods and expert services
- Sporadic, inconsistent, and uncoordinated institutional reforms
- Weak legal and regulatory frameworks
- Lack of codes of conduct and disciplinary mechanisms for researchers—i.e., lack of professionalism
- Poor links (large gap) between researchers and policy makers

- Lack of multi-sectoral planning perspectiveUnfair global markets—subsidies and various trade barriers in developed countries (US and Europe)
- Limited capacity to meet international standards
- Limited access and voice in standard-setting
- Limited understanding of the range of opportunities open to countries
- Lack of home-grown trade/investment strategies
- Limited capacity and willingness to engage in trade and investment promotion
- Lack of effective and well implemented IPR
- Lack of incentives for promotion of indigenous technology/innovations that promote commercialization
- Slow rate of harmonization of trade instruments

III. Institutional Constraints

- Lack of information on current market opportunities – prices across markets, quality, etc
- Lack of market analysis (e.g. to assist farmers in understanding and anticipating market dynamics)
- Traders – too few for adequate competition, often colluding against interests of the producers, and with too many steps in the market chain; at same time, lack of trader organisation, information, power
- Inadequate market opportunities [even with fuller exploitation of existing opportunities as described in points above]
- Grades and Standards (to meet new market needs phyto-anitary requirements, etc)
- Poor infrastructure – transport, roads, etc.
- Lack of organisation of dispersed small farmers
- Taxation rates for local, national and cross-border marketing
- Seasonality in production, with limitations in quality, storage and institutional support
- NARS --- Generally weak linkages among their components
- IARCs --- Imbalance in funding levels and poorly linked in regional programs
- Lack of resources – hence lack of continuity of programs, lack of NARS researcher incentives (and hence their inadequate commitment)
- Lack of government commitment to research and extension (funds often do not extend beyond salaries) and hence dangerous over-dependence on donors
- Research management -- lack of focus, too many programs, high overhead costs
- Insufficient and sometimes inappropriate training

- Poorly defined mechanisms for bridging S&T vs. R&D orientations
- Lack of legal and political instruments/institutions supporting consistent S&T policies
- Lack of national science academies
- Lack of professional accreditation standards
- Poor links between researchers and policy makers
- Poor links between research and commerce
- Lack of modern technology transfer perspectiveLack of effective IPR
- Low status/prestige of scientists in policy processes
- Lack of structures and mechanisms for scientific information to influence policies
- Lack of awareness among professionals on how to participate in political processes
- Low quality of scientific education—primary, secondary, university
- Increasing effects of human health on S&T human capacity