



Ninth International Workshop

Sustainable Management of Marginal Drylands – Phase 2 (SUMAMAD-2)

**Bobo Dioulasso, Burkina Faso
14-19 December, 2011**

Workshop Report

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1. Introduction

Within the framework of the second phase of the Project “Sustainable Management of Marginal Drylands” (SUMAMAD-2), UNESCO, the UNESCO National Commission of Burkina Faso (CN/UNESCO), the National Committee of Burkina Faso for the Man and the Biosphere (MAB) Programme and the National Center of Scientific and Technological Research (CNRST) organized the project’s Ninth International Workshop which was held in Bobo Dioulasso (Burkina Faso) from 14-19 December, 2011. This workshop was the third meeting of the SUMAMAD project team leaders within the second phase of the SUMAMAD project (2009-2013). The workshop was held in conjunction with Burkina Faso’s celebration of the 40th anniversary of the UNESCO MAB Programme which took place on 17 December, 2011. The Workshop Agenda is attached as Annex 1 to this report.

The SUMAMAD Project is implemented by UNESCO’s Man and the Biosphere (MAB) Programme in direct collaboration with the United Nations University – Institute for Water, Environment & Health (UNU-INWEH), thanks to funding provided by the Flemish Government of Belgium.

The workshop participants included representatives of the project partner research institutions, as follows:

- Bolivia: Universidad Mayor de San Andrés
- Burkina Faso: Institut de Recherche en Science de la Santé (IRSS) Centre Nationale pour la Recherche Scientifique et Technologique (CNRST)
- China: National Committee for UNESCO-MAB Programme at the Chinese Academy of Sciences
- Egypt: University of Alexandria and Omayed Biosphere Reserve
- India: Central Arid Zone Research Institute (CAZRI)
- Jordan: The Royal Society for the Conservation of Nature (RSCN)
- Pakistan: Pakistan Council of Research in Water Resources (National Committee for UNESCO-IHP Programme) and National Committee of UNESCO-MAB Programme
- Tunisia: Institut des Régions Arides (IRA), Medénine

The representative from the Research Society for Sustainable Rehabilitation of Drylands (REaSSURED) of the Islamic Republic of Iran was not able to attend the workshop due to visa problems.

Moreover, representatives from UNESCO, UNU-INWEH and the Flemish Government of Belgium, including a scientist from the University of Ghent (Belgium), as members of the SUMAMAD core management team, attended the workshop. Special guests included the Ambassador of Belgium to Burkina Faso, Mali and Niger, as well as a representative of the UNCCD Secretariat. The List of Participants is appended as Annex 2 to this report.

2. Objectives

The Ninth International SUMAMAD Workshop brought together the designated national project coordinators from the above-mentioned partner research institutions and the members of the project's core management group. The workshop's objectives were to:

- Review the implementation of the SUMAMAD project and its national field project activities since the 8th international SUMAMAD workshop held in Alexandria in November, 2010;
- Discuss technical issues for the implementation of the SUMAMAD project in 2011 and discuss future project activities planned for 2012.

The national project coordinators presented the SUMAMAD project activities undertaken in 2011 as part of the workplans stipulated in the SUMAMAD-2 Project Document, through funding provided by the SUMAMAD project. Each representative presented the field activities carried out in 2011 and results that were achieved, which was followed by a question and discussion period.

3. Proceedings

3.1. Opening Session

The Opening Session was moderated by Ms S. Larba Angel Oubda of the UNESCO National Commission in Burkina Faso. It was attended by His Excellency Mr Adrien Théâtre, the Ambassador of Belgium to Burkina Faso, Mali and Niger; representatives from the UNESCO National Commission of Burkina Faso; the Ministry of Scientific Research and Innovation of Burkina Faso, and SUMAMAD project partners (field project team leaders, the Flemish Government of Belgium, UNESCO and UNU).

The workshop opened with welcome addresses from the following representatives:

- Ms Alizeta Kafando, UNESCO National Commission of Burkina Faso;
- Mr Boubacar Cissé, Africa Regional Coordination Unit, UNCCD Secretariat;
- Dr Richard Thomas, Assistant Director, UNU-INWEH;
- Dr Rudy Herman, Flemish Government of Belgium;
- Dr Thomas Schaaf, Chief of Section, UNESCO, MAB Programme;
- Prof. Hassanata Millogo/Kone, Secretary-General of the Ministry of Scientific Research and Innovation of Burkina Faso

Ms Alizeta Kafando opened the workshop by highlighting the occurrence of the workshop within the 40th anniversary of the MAB Programme. She presented the objectives of the workshop which are to review progress to date, discuss technical issues, exchange experiences between country partners, and overcome stumbling blocks.

Mr Boubacar Cissé highlighted the unique position of the UNCCD as the only convention to address drylands and land degradation issues. He highlighted the role the UNCCD plays in the transfer of scientific and technological knowledge, and expressed interest in the development of economic scenarios and adaptation to climate change, both of which fit well within the Strategy of the UNCCD. Mr Cissé also highlighted the UNCCD Fellowship Programme as one potential area for collaboration between the SUMAMAD project and the UNCCD.

Dr Richard Thomas expressed thanks to UNESCO for their commitment and continuation of the project, and thanks to the Flemish Government of Belgium for their support. Dr Thomas noted that the SUMAMAD funds have served as key catalytic funds for greater synergies and co-financing and that the SUMAMAD teams should look further to measure and demonstrate to donors the impacts that have been achieved. Dr Thomas emphasized the capacity-building aspect of the project, noting its inter-disciplinary nature in bringing together environmental sciences and socio-economics. He also highlighted future directions of the SUMAMAD project, including: the Fellowship Programme of the UNCCD; opportunities for using the SUMAMAD research sites for interdisciplinary training and information exchange programmes; and, linkages with the Joint Master's Programme on Integrated Drylands Management.

Dr Rudy Herman expressed his delight in seeing positive examples in Burkina Faso of what can be achieved under the SUMAMAD project. He noted that although the financial crisis has affected many countries and international cooperation since 2008, the funding for the second phase of the SUMAMAD project has been secured until the end of the phase. Dr Herman remarked upon the key role SUMAMAD could play in addressing emerging challenges, such as climate change and extreme events like droughts and floods, through the research being done on preserving natural resources and improving management of these resources, especially from a local perspective. In light of the upcoming review and the potential next phase, SUMAMAD partners should prioritize water conservation practices, especially through an ecosystem-based approach, with consideration of local peoples and their needs, and the importance for reporting and networking. Dr Herman suggested that SUMAMAD could benefit from additional training opportunities and this could be done for example through exchanges and links with Belgium experts, scientists and students. He also encouraged UNESCO to continue providing opportunities for scientific exchanges.

Dr Thomas Schaaf remarked upon the level of familiarity that has developed amongst the SUMAMAD partners and encouraged the exchange and sharing of new ideas from each country's practices. He acknowledged the focus on applied research for the conservation of water and soil, but also emphasized the need to focus on people and their needs. Dr Schaaf thanked Jean-Noel Poda, who had introduced him to the Mare aux Hippopotames Biosphere Reserve already 24 years ago, for hosting the workshop, and thanked the Flemish Government of Belgium for funding the SUMAMAD project and entrusting UNESCO with its

implementation. Dr Schaaf noted that the SUMAMAD project had received a very favourable review following a critical evaluation of the first phase, and challenged all project partners to retain or even improve this status for the second phase of the SUMAMAD project.

On behalf of the Government of Burkina Faso, Professeur (Ms) Hassanata Millogo/Kone welcomed participants to the workshop in Burkina Faso. She stated that the management of natural resources in dry areas is of keen interest to Burkina Faso as it faces very high climatic variability, from periods of droughts to periods of heavy rain, affecting food production. The scientific research being conducted under the SUMAMAD project offers valuable opportunities for developing alternative, credible solutions to problems that were previously thought unsolvable. She expressed her confidence in the results that will emerge from the SUMAMAD project and thanked the Flemish Government of Belgium for supporting the project. Ms Millogo/Kone warmly invited all participants to visit the SUMAMAD project site in Burkina Faso at the Mare aux Hippopotames Biosphere Reserve, and conveyed the hospitality of the Burkinabes of Bobo Dioulasso to workshop participants.

3.2. Session 1: Presentation of Project Activities by National Team Leaders

a) Jean-Noel Poda, Mare aux Hippopotames Biosphere Reserve (MHBR), Burkina Faso

Dr Poda reported that environmental degradation due to climate change and human activities is gaining ground in Burkina Faso, causing decreases in soil productivity and impacting biodiversity. This negative trend will continue if measures are not taken to limit it, and efforts are being made in the MHBR and its riparian villages for biodiversity conservation and sustainable development.

Under the SUMAMAD project, activities are being carried out together with local populations to improve the management of the MHBR. AGEREF, a local inter-village socio-professional association, worked with local producers using the MARP approach (Accelerated Method of Participative Research) in order to ensure sustainable and participative management of the natural resources in the zone, and to give stakeholders responsibility in the implementation of activities. Dr Poda reported that AGEREF further acted as an interface for exchange with other local institutions.

For the improvement of dryland agriculture, demonstration sites were established of ecological orchards, mainly of mango and citrus trees, to replace cotton production as a soil restoration effort. This activity also allowed the project team to raise awareness amongst the local populations about the high soil exploitation and resource imbalance caused by cotton production while providing them with an alternative for generating income. The collection of non-timber forest products has also been identified as an alternative source of income.

A survey was conducted of the fishing activities in the MHBR as this resource is under threat. This survey will help in developing a set of recommendations for better management of this resource which many families rely upon for income. Already, the implementation of a previous recommendation has helped to assess the evolution of fishing activities and productivity of the pond.

Dr Poda reported that anticipation scenarios and environmental education is being carried out at the Bala school through the use of theatre. Further, Forest Management Groups are being developed as multi-disciplinary teams and include important parts of the local population. Partnerships with other institutions are expected to be reinforced through scientific training and technical support, and the national training seminars are helping to target local populations.

Discussion

In response to the questions that were posed, Dr Poda clarified that currently the population is continuing with cotton production while also planting fruit trees; this is due to the time delay that will occur with the planting of trees before they become productive. Although it is a long process, the local populations are interested in continuing this initiative because of the opportunity it offers to supplement their income. If successful, this model can be replicated in other areas. It was further suggested that banana trees could also be considered to be planted, as banana production is less water intensive and offers opportunities for textile production.

With regards to fishing, it was suggested that fishing tools be restricted for fish up to a certain size, and that this should be conveyed to policy-makers. Dr Poda agreed on the importance of this, and added that it is very important to properly manage the size of the catch; this will be looked at during the following year's activities. It was further suggested to have a local authority responsible for the monitoring and regulation of the net size to help manage the catch of the fish and to know what's growing in the area, while also giving equal importance to the voices of the local populations.

Participants commended the various opportunities that were offered for including the local population in the activities, including through local organizations, radio, and schools which in turn raised awareness through teaching/training activities.

b) Gaoming Jiang, Hunshandake Sandlands, China

Prof. Jiang reported that three main activities were carried out for fostering scientific drylands research: experiments on feeds consumed by chicken to determine the ideal feed types; identification of feed resources for free-range chicken; and, NPP monitoring and land use patterns. He reported that the water and nutrient components of some common plants available for chicken feed were analyzed. Land use patterns in Zhenglan Banner were identified and a protected, core area was established in the Sandlands for chicken farming. Prof. Jiang reported that new land use patterns have been tested with local families, which also provide them with alternative sources of income; these include chicken farming, baby cattle breeding, and organic milk tofu production.

Prof. Jiang informed that a proposal was developed by the project team to establish the largest eco-husbandry industry demonstration region in China's grasslands; this is based on the past 10 years of successful demonstration of the Hunshandake project and the successful eight years of the SUMAMAD project. This plan was presented to the Director at the Institute of Botany at the Chinese Academy of Sciences (CAS), and the Deputy President of CAS, and as a result, eco-husbandry became one of its eight mainstream research directions for 2010-2020.

Prof. Jiang reported that during the national seminar, participants discussed the economic and ecological benefits for replacing cattle breeding with chicken farming in the grasslands. They further discussed possibilities and approaches for increasing the productivity of the grasslands as a way to support increasing populations, and talked about the potential for carbon sequestration and biodiversity conservation in China's sandlands if well restored.

Prof. Jiang informed participants that important decisions had been taken by the government to adopt eco-husbandry of chickens in the grasslands of China; the suggestions made by the SUMAMAD project team and the restoration success of the project has provided strong evidence for these policy decisions.

Some challenges that were highlighted by Prof. Jiang include the financial shortages experienced by the partner private company due to the financial crisis, and the threat of wild

animals to free-range chicken farming which results in loss of chickens. The latter is being addressed by constructing chicken houses using native materials by skilled local people.

Discussion

In response to questions regarding the chicken farming, Prof. Jiang clarified that the plant species used for feeding is being analyzed according to the type of animal (cattle, goat, sheep and chicken) in order to determine whether land use patterns should be changed. He further clarified that two types of chicken farming are being done, for meat and for eggs; separate grasslands are being used for each.

Regarding the compensation from the central government that is being received by families, Prof. Jiang clarified that this money is provided if the land is found to be in good condition; if the land is degraded, no money is given. Under the eco-husbandry model, Prof. Jiang and his team intend to demonstrate to families that by using only 10% of their land for chicken farming and conserving the remaining 90%, they will receive more income than they would through the compensation amount given by the government for keeping the same amount of land in good condition.

Dr Schaaf encouraged highlighting the production of organically produced chicken as a means to conserving the environment and restoring degraded ecosystems while benefitting human well-being; he encouraged other project partners to explore this direction. Dr Schaaf indicated that examples such as these, where it is possible to demonstrate that diversification of incomes also act as a safeguard against global and climate change variability, will be a strong point to make to policy-makers.

Dr Thomas wondered if 'large chicken farming' was economically feasible and suggested a feasibility study thereon, also with a view to replicating the chicken business elsewhere.

Dr Herman was encouraged by the interest of the Chinese Government in the ecological restoration and value of ecosystem services of the grasslands. Indeed, Prof. Jiang confirmed that the Chinese government has recognized the importance of ecosystem services and their preservation while equally recognizing the importance of economic development. With regards to the demonstration site, Prof. Jiang indicated that in the long-term around 10,000 km² will be developed, but that it will be built over a 5-10 year period. He confirmed that the feeding patterns of chicken will be monitored in order to ensure that the grasslands are maintained in a healthy condition.

c) Boshra Salem, Omayed Biosphere Reserve (OBR), Egypt

Prof. Salem reviewed the work that was done in the previous year using the geo-databases to help define variable systems of the OBR and to monitor changes in land cover in order to determine the impacts on ecosystem services and what effects any declines in ecosystem services would have on social patterns and activities of the indigenous communities. This led to the development of a management plan for the OBR, which, however, had a short lifespan due to the political changes in Egypt in 2011. As such, the geo-databases were reviewed and the OBR management plan was refined. The OBR has been split into two areas (north and south), each with different activities, and five core areas have been suggested.

Prof. Salem reported that the extension of the lake, which is a threat to the OBR, was happening in parallel with the extension of agricultural activities, leading to a seepage of water from high to low land irrigation and resulting in the deterioration of olive trees. This led the project team to study all the water systems in the area and their effects on OBR. It was found that the lake extension is having effects on water systems both within and outside the OBR, affecting land use patterns. Prof. Salem advised that if this continues, we can expect to see high soil salinity in the future.

Prof. Salem presented the work that is being done on the use of vegetation Gel Nutrition Media (GNM) on threatened species in the OBR due to its water-efficient properties. Experiments were carried out in the lab and in the desert using soil and seeds from the desert, mostly barley. Early indications show that the area treated with GNM is producing more vegetation. The use of GNM might be a cost-effective approach for conserving water and increasing soil conditions. Prof. Salem presented the work that is being done on assessing the natural recharge of groundwater lenticels to estimate the sustainable water abstraction; this activity is still ongoing until the end of the rainy season (March 2012).

In terms of policy-relevant guidelines for decision-makers, Prof. Salem indicated that documents (e.g. leaflets) were produced in Arabic on the importance of biodiversity and its conservation and the conservation efforts being made. Training is also being provided to local communities through workshops.

As for sustainable livelihoods in drylands, Prof. Salem and her team are exploring the cultivation of olive propagules for the production of olives and oils as an alternative income. This activity is still ongoing; olive propagules have been raised and a connection has already been made to distribute 50 propagules to selected reliable individuals from the local community through a local NGO. Prof. Salem reported that work is ongoing to improve the solar desalination units in order to improve efficiency and reduce costs as the local communities using the units indicated that the quality of water is good, but that the quantity is insufficient.

Discussion

In response to questions about the GNM, Prof. Salem clarified that the GNM is made of completely natural materials: it is agar-based, and when combined with sucrose and water and boiled, it produces a gel. Prof. Salem indicated that it is water-efficient, making nutrients available to plants, and therefore wanted to explore its use in desert plants. It is however, a temporary application and must be renewed.

A general remark or comment was made on the use of GNM for crop production (wheat, maize) as this is rather the objective and task of FAO projects.

In response to some confusion over the area where depletion of groundwater and intrusion of seawater into aquifers is occurring, Prof. Salem clarified that the OBR has now been divided into two different areas due to the distinct features of each area. As such, the northern area has shallow aquifers and the southern area is where the extensions of the canal are found.

Dr Herman and Prof. Gabriels remarked upon the importance of linking the various activities being conducted by the project team, such as the exploration of the water systems and the improvements in the desalination units, to the water conservation practices objective of the overall SUMAMAD project.

d) Dr T.K. Bhati, Arid Western Plan Zone (Thar Desert), India

Dr Bhati began by presenting an overview of the two SUMAMAD study sites in the Thar Desert, one with annual rainfall between 200-400 mm and the second with annual rainfall of less than 200 mm, and remarked upon the increase in livestock pressure between 2003 and 2007. He then continued to present the activities which are being conducted under the objective of fostering scientific drylands research. The project team is: conducting experiments on improved varieties of dryland crops via Integrated Nutrient Management (INM); analyzing the performance of an improved single slot weeding tool (*kassi*); constructing field and contour bunds in order to reduce soil erosion and encourage uniform water distribution in the field; conducting hydrological and yield observations; constructing runoff collectors and observing the rainfall-runoff relationship; classifying soil and assessing

soil health; and, conducting an experiment of planting fruit plants as a water conservation method for use in the *khadin*.

In terms of policy guidelines, Dr Bhati indicated that his institute (CAZRI) has experience in the development of policy-relevant practices. The interventions that have been made in collaboration with the SUMAMAD project include: scenarios of farming systems in hot, arid regions of India; highlights of expected climate change impacts (changes in rainfall, temperatures) and their likely effects on farming systems; modeling of wind and water erosion processes; the development and management of rangelands; planning based on approaches to livelihoods promotion; and, policy interventions.

Dr Bhati reported that opportunities for alternative income generation include: applying gum inducer to trees for increased gum production; increasing the growth of the local *ber* and *khejri* trees through *in situ* budding; enhancing milk production of goats through supplementation of vitamins and minerals through a nutrient mixture; enriching fodder quality through urea treatment; and, installing animal feed solar cookers.

A number of training opportunities were also provided to local communities through field visits and interactive discussions with local farmers on pasture development and management, and through animal health camps.

Discussion

Responding to a question about the impacts of climate change, Dr. Bhati indicated that the climate predictions were based on data from an International institute (Hadley Centre for Climate Change, UK) for projections to 2070; Dr. Herman concurred that India is named as a hotspot for increased temperature by the IPCC reports. As such, the project team is concentrating on certain plants that can survive in very high temperatures to introduce them into their production systems and economic chain. With regards to the predictions for the changes in rainfall and their impacts, Dr. Bhati explained that the surface irrigation systems have a limitation of 21 feet of suction head, thus a high runoff through enhanced rainfall intensity may pose a challenge for these systems.

Regarding the solar cookers, Dr. Bhati explained that the animal feed solar cooker have great potential to save fuel consumption and also to save time and energy of rural women in desert areas.. In response to a question on how much urea treatment was given for fodder enrichment, Dr. Bhati indicated that the increase was between 2-4 % using 100 l of water and that this was for big animals such as cattle; a different mixture is used for sheep.

Dr. Thomas commented on the valuable experience in India and Pakistan on the use of trees in drylands, and the potential they offer for carbon sequestration and PES schemes. However, he noted that a debate still exists on the use of trees in drylands and therefore caution should be used, and monitoring of the water cycle should occur whenever trees are being introduced or chopped down. Dr. Bhati indicated that plants must be introduced according to productivity and density in order for them to be effective; going beyond that will only be counter-productive.

e) Zamir Ahmed Soomro, Lal Sohanra Biosphere Reserve, Cholistan Desert, Pakistan

Under the first objective of fostering scientific drylands research, Engr. Soomro reported on two activities: the restoration and rehabilitation of degraded rangelands, and the introduction of dryland crops. As there is insufficient rainfall during the year in the Cholistan desert, the restoration and rehabilitation of rangelands is dependent upon water supplements for irrigation which comes from two main sources: harvested rainwater and groundwater. Due to the drought that occurred between 1999-2009, most of the grasses vanished. With the assistance of the SUMAMAD project, the area was reseeded and irrigation supplement was

applied in addition to rainfall. The vegetation cover is steadily increasing, with the area producing its own seed this year. The productivity of the rangelands was measured through the growth of canopy cover and biomass, divided into three sites for controlled and uncontrolled grazing. Two fodder crops (cluster bean and millet) were introduced to support livestock rearing, and this was done with water applied through a sprinkler system using an irrigation supplement.

Engr. Soomro informed that a core management group that brings together institutions, universities government and local representatives had been established for developing policy-relevant guidelines. Three major areas were identified for the sustainable management of drylands: the introduction of Resource Conservation Technology, raising awareness for adopting controlled grazing systems, and establishing a rangelands decision-making forum for the welfare and rational use of rangelands. A meeting was held with the core group where they learned of the interest and responsibility taken by the local community in rangeland conservation and management via techniques learned from the SUMAMAD project.

Engr. Soomro reported that alternative income-generating activities include livestock rearing through enhancement of forage, producing handicrafts, and improving agricultural activities on the periphery of desert land. The national seminar focused on "Management Practices for Rehabilitation of Degraded Dryland Ranges" and was attended by around 200 participants (male and female) from the local community and private and public organizations.

Discussion

In response to questions that were posed, Engr. Soomro clarified that the canopy cover was determined by the vegetation found under the surface, including palatable, non-palatable and browsable biomass. Dr Schaaf commended the Pakistan project team for including the local people in the establishment of controlled grazing areas using fences and explaining the benefits to them. Engr. Soomro noted that local people have been involved since the beginning, and that this model will be used for demonstration to the government and can also be used for the collection of seed. In response to Dr Schaaf's question about the fish ponds, Engr. Soomro confirmed that these are still continuing and that another fish pond site has been established.

Prof. Gabriels pointed out that because of low rainfall amounts (145 mm/year) a supplementary irrigation is needed. The question remains on how the 'crop requirement' will be determined and how the Potential Evapotranspiration (ET_o) of the crops (cluster bean, millet) will be calculated. SUMAMAD partners and experts can help in this respect.

f) Abdullah Al-Klob, Dana Biosphere Reserve (DBR), Jordan

Mr Al-Klob began by presenting an overview of the DBR and the current year's objectives. DBR is a large reserve of biodiversity in Jordan and contains one-third of all species in Jordan. As such, activities in the DBR focus on biodiversity conservation and eco-tourism. This year, a rapid assessment of the natural watering points in Al-Barrah was conducted in order to select three for cleaning and renovation. These watering points will provide water to stockowners during their stay in the area.

A two-day workshop was held to develop scenarios for grazing management in full consultation with the local community. Management techniques include rest rotational grazing, expansion of the grazing area to lower areas, and reducing grazing pressure through a grazing share in an effort to maintain the current status and usage. A capacity-building workshop was held on rangeland management where experts from other Biosphere Reserves were invited to participate in order to share experiences. In order to regulate and manage grazing in DBR, a rangeland grazing management plan and monitoring and

evaluation programme were set up, and a Memorandum of Understanding was signed with the Barret Dana Cooperative.

Mr Al-Klob highlighted a few key lessons learned: locals possess the information necessary to preserve and improve their environment and resources, but some scientific guidance is still needed; incentives should not be provided in the form of money but should be given in the form of resources improvement to enable them to improve their livelihoods in the long-term; and, successful participation from the local community will happen only if there is ownership from them in all resource management issues.

Discussion

Responding to Prof. Jiang's question on whether the wastewater from the cement factory could be used, Mr Al-Klob indicated that they are currently exploring this option and developing a proposal with one aspect focusing on what effects the water quality will have on livestock. Prior to commencing any such project however, some evaluation will be done of the water coming out of the factory. Responding to another question from Prof. Jiang, Mr Al-Klob confirmed that there are 3,500 animals in the area and 40 families.

Prof. Salem cautioned against increased evaporation rates in the watering points, but Mr Al-Klob explained that due to the low temperatures during the rainy season, this is not a concern. He clarified that the ponds do not need extensive cleaning, but the sedimentation does need to be removed.

Prof. Salem inquired about the process of the grazing share and whether the pressure is increased. Mr Al-Klob explained that the people share the land, which has a carrying capacity of 4,000 animals. It is managed through selective grazing, and the grazing share is reduced during the dry season.

Dr Herman commended the guidelines which were developed for grazing management, and suggested that these could be shared with the other SUMAMAD project partners.

g) Mohamed Ouessar, Zeuss-Koutine Watershed, Tunisia

Dr Ouessar reported that a number of studies were carried out in Bou Hedma and Jeffara by a multi-disciplinary team. These studies were done in collaboration with the University of Ghent and with additional funding provided by the Flemish Government of Belgium. In Bou Hedma, research was conducted to look at the linkages between communities and socio-economic, cultural and biophysical dimensions using the DPSIR framework. This study concluded that the attitudes of local communities are the driving forces behind the environmental degradation, leading to high unemployment and high rates of poverty.

A second study looked at the influence of afforestation on soil properties and climate, while a third study looked at the consequences of natural resources management on livelihoods in the Zeuss-Koutine watershed. The challenge that emerged from the latter study is how to find a balance between natural resources management and providing opportunities for livelihoods in a harsh and deteriorating environment.

Dr Ouessar also informed on the activities for promoting alternative tourism in dry areas of Tunisia. Alternative tourism can be fair tourism, responsible tourism or solidarity tourism, but the main principle is that it will benefit the local communities. The project team is in contact with a specialized tour agency based in France which markets this type of tourism. Tamadi Voyages maintains strict standards and ensures that 70-80% of revenues go back to local communities. During the national seminar, there was some demand for increased training in climate change and vulnerability. The project team also held a training workshop on eco-tourism.

Discussion

Dr Schaaf noted that the planting of trees and the creation of a micro-climate raises the same question that was raised earlier on the benefits of planting trees in drylands, and that this needs careful examination and further study. In response to Dr Herman's question on the eco-tourism training, Dr Ouessar clarified that training was provided to five NGOs.

Dr Herman commented that the future planned activity for putting together education kits was also mentioned by Jordan, and that it would be a good idea to put together a kit and test this out in a local school near the project site and to be able to report by the end of the SUMAMAD project on whether it's beneficial to use these kits and any challenges that were experienced in using them. Dr Herman suggested that all project partners could explore this activity using the education kits available from UNESCO, which exist in four languages.

Prof. Gabriels strengthened the point made by Dr. Herman that all project partners should test out the UNESCO Teaching Resource Kit for Dryland Countries in 2012 in a local school near to their project sites.

h) Jorge Cusicanqui, Bolivian Highlands, Bolivia

For the presentation of his country's activities, Mr Cusicanqui indicated that due to the different agricultural calendar in Bolivia, he would be reporting on the results from activities concluded in 2011 for the 2010-2011 agricultural year and presenting the activities that are currently being initiated for the 2011-2012 agricultural year.

As for the results from the previous agricultural year, the project team found that reduced applications of manure to quinoa fields were not worthwhile due to a low yield response. Higher applications were also found to not be worthwhile. Further, the mineralization rate of manure showed that when applied just before sowing, it will have little or no effect on yields, especially under low application rates. A suggested rate of manure application (15 TM/ha) in very low fertility soils was found to be responsive on the condition that it is applied within 2 months before the sowing period.

The preparation of policy-related guidelines was done through a number of publications and handbooks, including: a joint publication with the QUINAGUA project on the results of research on deficit irrigation and soil fertility; a paper on factors that affect farmers' choice for deficit irrigation and inputs for quinoa production; and, a paper on the economic assessment at the farm level of the implementation of deficit irrigation for quinoa production. Training workshops were also held with farmers to disseminate the project's results.

Mr Cusicanqui informed that the current activities are focusing on replicating the successful activities in a new study location with a specific soil type, with an additional controlled experiment site being established for the comparison of results. The evaluation of nitrogen mineralization and phosphorus contents will be repeated on the different soil types. Further, projections on extreme events will be evaluated based on already-processed climatic data. The project team will focus on developing quinoa manuals and guidelines oriented to soil and water management, and the successful crop calendar will be revised and reedited for wide distribution. The national seminar will discuss the importance of manure and fertility management for soil microbiology given its importance in dry areas for promoting soil fertility.

Discussion

In response to questions regarding the application of manure and its mineralization rates, Mr Cusicanqui clarified that the soils are very poor and thus have very little mineralization, despite the application of manure. In addition, farmers are changing their land use from grazing to quinoa production due to market pressures, which will result in desertification because of the lower availability of llama manure. He asked for advice from project partners.

Prof. Gabriels advised that composting would be a better alternative, as studies in Tunisia on this same problem showed that using manure has no effect on soils in such a situation. Prof. Gabriels stated that mineralization of soil will only take place after a minimum of two years, so it is a longer-term process that will take some time before knowing whether it is having any effect. Dr Bhati agreed, especially when it comes to cattle manure, and added that it also depends on the type of manure, whether it's from goat, sheep or chicken. Dr Thomas suggested that it would be useful to look at the mineralization process and that a lot more detailed soil work would be needed.

3.3. Session 2: Technical Issues and Future Project Activities

a) Publications and Workshop Proceedings

Dr Schaaf informed partners that following some delays, the workshop proceedings from 2010 (Alexandria, Egypt) are nearly ready in non-print form. Some delays had occurred as project partners had to submit their authorization forms to UNESCO for the publication of the proceedings.

With regards to the proceedings from the current workshop (Bobo Dioulasso), Dr Schaaf proposed that the work from 2011 be combined with that of 2012 into a final Phase 2 publication. This stems from a request from the UNESCO governing bodies to reduce the number of publications being produced, but Dr Schaaf suggested that this opportunity be used to put all efforts into producing a consolidated and excellent final publication.

Together with the project partners, it was agreed that manuscripts will be submitted to UNESCO by November 2012 prior to the next international workshop. This will allow the manuscripts to be used by the evaluators for the review of Phase 2 of SUMAMAD, while at the same time it will allow time for updating the reports following the workshop and editing them for production of the final publication by the end of Phase 2 in mid-2013. This final SUMAMAD publication will include the overall results and recommendations that emerged from each country site from 2009-2012. Dr Schaaf and Dr Thomas will define a structure for the chapters and send it to team leaders for feedback before finalization.

Several views were raised by the project partners:

First, it was noted by several project partners that differences in the agricultural calendar present constraints to them for final, overall reporting by the end of 2012. It was suggested that while draft manuscripts be submitted in November 2012, further finalizations continue in the 2-3 months that follow.

Second, country partners expressed their desire to see their work from 2011 recognized, and Dr Herman expressed the importance of acknowledging the yearly workshop for reporting purposes but also in recognition of Dr Poda's efforts in organizing the workshop. As such, it was agreed that the 2011 reports would be made available online in a non-print version. It was also agreed that the presentations from the workshop would be made available online, and that the same could be done for presentations from past workshops. Country partners were asked to please submit their workshop presentations from the 2nd Phase to UNESCO.

Third, concerns were raised about how to document the results and recommendations of the project that will only be seen towards the end of project implementation given the manuscript submission date of November 2012. Dr Schaaf suggested that a final section could be included in each chapter on future research based on the research findings thus far, where partners could elaborate on what they are expecting to do and/or achieve.

Dr Schaaf reminded country partners that while it is good to document what has been achieved within the project, it is also important to demonstrate the multiple or lasting effects that the project has had outside the project. Although there have been no firm commitments at this stage, Dr Herman indicated that a third phase may be possible. However, SUMAMAD should not be thought of as a standalone activity but should be an ongoing process which is occurring jointly with the partner institutes and which will have a lasting effect.

Finally, it was agreed that this scientific publication would be produced jointly with a policy brief, as was done for Phase 1. Dr Herman emphasized the importance of both these publications, as the final SUMAMAD publication and policy brief from Phase 1 have been referenced several times by the Belgium Government and the Directorate-General of the European Commission, and also help to increase the visibility of the project partners. Although time is limited for completing the publication by mid-2013, Dr Herman noted their importance and that they should be well done.

Prof. Salem suggested that the impacts of the policy briefs be documented, and that an assessment should be done on the impacts of the first policy brief. Dr Herman also suggested that the local impacts of the recommendations from the first phase be measured, and that this would be better assessed by the project sites at the local level.

Dr Herman noted that the influence of the first policy brief and the impact of SUMAMAD's work can already be seen in the priorities of some governments and UN agencies as the recommendations from the policy brief can be generalized. For example, the Research Programme on Sustainable Development in Belgium has taken into account the recommendations that came out of the SUMAMAD project, and these have been written into the research priorities for project proposals; the same is true for Europe in general.

Prof. Jiang suggested that the recommendations be translated into the languages of each of the countries so that they may be shared with relevant stakeholders in each of the partner countries. He noted that while policy-makers might not be interested in scientific data, they are interested in policy recommendations; a short policy brief translated into each language would be beneficial, to which Dr Herman concurred. Dr Schaaf suggested that a short, 1-page information page from each country could be produced, and that the policy brief could be made shorter than the last one, with a 4-5 page summary translated into each language. UNESCO and UNU-INWEH will work together to develop a draft structure and send it to country partners for their feedback before finalization.

b) 10th International Project Workshop: Bolivia, November 2012

Mr Cusicanqui formally accepted the invitation from Dr Schaaf to host the 10th International Project Workshop in Bolivia in November 2012. Mr Cusicanqui identified the week of 12-16 November as the potential dates for the workshop. He indicated that the workshop would take place in La Paz and would include a field trip to the local communities and the salt lake. Ms Lazic requested that the arrangement of flights be taken into account when determining the dates of the workshop, so that participants arrive during the week and the field trip takes place during the weekend. Dr Schaaf indicated that at the next workshop, country partners would present activities that were completed in 2012.

c) Final SUMAMAD Phase 2 Conference: University of Ghent, Belgium, 17 June 2013

Prof. Gabriels formally accepted the invitation from Dr Schaaf to host the final SUMAMAD Phase 2 Conference at the University of Ghent in June, 2013 as part of other events for World Desertification Day and the UN Decade for Deserts and the Fight against Desertification in conjunction with other partners, among which possibly the UNCCD. Dr Schaaf clarified that at this final workshop of Phase 2, country partners would present results from their project site over the entire 5 years. Prof. Gabriels suggested that these could be published in a conference proceedings or scientific journal as case studies, as they would include points that may not have been included in the manuscripts submitted at the end of 2012.

d) Reporting: 1-2 page Mid-term Reporting

Similar to what was requested this year, Dr Schaaf proposed that country partners submit a short 1-2 page summary report on the activities carried out in 2012 prior to the next workshop in 2012. Country partners agreed and indicated that they found it to be very helpful in preparation of the workshop.

e) Training Activities under SUMAMAD

Dr Schaaf indicated that no concrete proposals had been received from any of the SUMAMAD sites for specific training needs. He added that if any country partner has a concrete training proposal for a training need in addition to the national seminar, to please submit this to him for consideration. The budget for this would be around \$2,000 USD.

Prof. Salem inquired as to whether a training session could be included as part of the international workshop in Bolivia or Belgium. Suggestions included training on ecological accounting and environmental valuation, or training on deficit irrigation, although the latter would require some basic knowledge on the part of participants and would pose a challenge in terms of how to calibrate it for each country. Dr Schaaf invited Prof. Salem to explore options for inviting an expert to conduct training on ecological accounting and environmental valuation, and to submit a proposal to him (costs of training, benefits to participants, etc.).

f) Impact Pathways, Richard Thomas, UNU-INWEH

Dr Thomas gave a presentation on impact pathways, a results-based management approach that goes beyond results and outputs to measure impacts. He indicated that it is important to determine where a project sits in the impact pathway chain in order to be able to identify where the gaps occur and where the most impacts can be made. He commented that until now, SUMAMAD country partners have done a great job in showing what impacts their projects have made, even up to a very high level; however, this is not being conveyed in the reporting, and should be included, especially in the final reports.

The impact pathway model involves an innovation system approach that shifts attention from results to innovation processes. The impact pathway model relies on an impact chain: once results have been achieved, it is important to determine the utilization of those results, their effects, benefits or drawbacks, and finally their impact. The further along the chain, the more difficult it is to attribute impact to a project's activities.

When using this model, it is equally important to identify constraints, which are grouped into four key areas: policy, knowledge, finances and institutional capacity. By identifying the key constraints that a project is trying to address, it will help to identify the impacts of a project's results. Dr Thomas outlined an eight step approach to conducting an impact analysis which leads to the development of an intervention logic.

As a concluding remark, Dr Thomas suggested that the final country reports include a section on impact pathway analysis.

Discussion

Dr Herman appreciated the presentation and suggested that the feedback loop, which is included in the eight step approach, be included in the diagramme to show that the feedback mechanism occurs. Prof. Salem commented that the direction of impact may not necessarily go downwards from supra-national to local, as was shown in the diagramme, but it may in fact go up from the local to the supra-national level. Dr Thomas agreed that it could go in either direction. Prof. Salem also added that a key constraint is missing, which she named as the local/cultural constraint.

g) Any Other Business

Engr. Soomro requested that invitation letters for the international workshop be issued well in advance in order to facilitate the visa process. He also indicated that if any transiting will be needed for travel to Bolivia that the issuing of tickets should be done well in advance in order to be able to obtain transit visas. Dr Schaaf noted these concerns, and indicated that UNESCO would coordinate the issuance of invitation letters with the Universidad Mayor de San Andrés.

Mr Cissé indicated that this was the first time that the UNCCD Secretariat has participated in any SUMAMAD workshop and noted that it is very relevant to the objectives of the UNCCD. He indicated that it would be interesting to have some presentations from the SUMAMAD partners during side events at COP meetings, and that these projects were very relevant for helping decision-makers in their SLM decisions. He indicated that he would report back to the UNCCD Secretariat on the positive results being achieved through the SUMAMAD project via its country sites and partners.

3.4. Session 3: Forward-looking Session: SUMAMAD 2012

Dr Schaaf invited country partners to present a general outline of the activities they intend to undertake in 2012. He asked partners to do so according to the project's three main objectives, namely: i) fostering scientific drylands research, especially in soil and water conservation, drylands agriculture and biodiversity; ii) scenarios and policy guidelines based on scientific research for advice at the local, national and even international level; iii) improvement of the livelihoods of local people through diversification of income opportunities. Dr Schaaf reminded all partners that the SUMAMAD project at large will be evaluated based upon the fulfillment of these objectives.

a) Boshra Salem, Omayed Biosphere Reserve (OBR), Egypt

Prof. Salem indicated that studies will continue on the use of gel nutrition material and will be expanded to include other important crops in the area to determine its effects in terms of productivity and water concentration. Work will be carried out to determine the potential for a conservation garden of biodiversity propagation for indigenous species. She indicated that the project team will continue to pursue improvements in the solar desalination system. Finally, they will work with the new government and local authorities to inform them of the SUMAMAD project and its activities, and will provide leaflets to locals which will include advice on climate change.

Comments

Dr Schaaf suggested that the project team could think about replicating on a larger scale the work that is being done on developing a new technology for water desalination units, and to see whether the cost can be brought down to enable it to benefit at a larger scale. Prof. Gabriels suggested that consideration be given to maintenance of the desalination units, and Prof. Salem suggested that perhaps training could be done with a few local people on how to maintain the units. However, she indicated that they are trying as much as possible to make

these units closed and self-contained. Prof. Gabriels inquired about when results would be available for comparison under the germination experiment of endangered species. Prof. Salem explained that they ran into some problems transferring them to the field, but that this has been addressed now so they will be able to propagate them there. Dr Schaaf encouraged Prof. Salem and the Egyptian team to continue working on drylands and climate change scenarios.

b) Jorge Cusicanqui, Bolivian Highlands, Bolivia

Mr Cusicanqui indicated that they will finish the calibration of the quinoa crop, and that most of the work done in 2012 will focus on soil fertility and manure, and soil biology. He indicated that they have already started on these activities as the growing season goes until the end of April. The project will further look at how the market insertion is working, as this is key for the sustainability of the crop in the future. Of course, the project team will also be busy preparing for the 10th International Workshop in November.

Comments

Dr Schaaf encouraged the Bolivian team to look into scenarios and policy guidelines for the future, both for people at the local level and for the government at the national level, in preparation for the end of the SUMAMAD project. Mr Cusicanqui indicated that they have already been working on climate change scenarios, and are now checking key scenarios for 2050, their major economic impact, and what measures can be taken for adaptation. Prof. Gabriels inquired about the suitability and sustainability of crops for consumption, namely the quinoa crop and whether it is mainly used for consumption or for other purposes. Dr Schaaf also commented on whether scenarios could be explored for the diversification of crops. Mr Cusicanqui informed that due to market pressures, farmers are changing their eating habits, so quinoa consumption is declining. He suggested that perhaps a recommendation could be made to the government on including quinoa in the breakfast at local elementary schools. He also clarified that other crops are being explored, but given the significant shifts of quinoa to a cash crop and the resulting shifts in markets and in land use habits by farmers, this needs to be reflected through the project and its activities.

c) Zamir Soomro, Lal Sohanra Biosphere Reserve, Cholistan Desert, Pakistan

Engr. Soomro indicated that they will conduct studies on vegetative species, their behaviour and natural growing system within the area where they have suggested protection and management studies. This will be done together with a professor with expertise in vegetative species. They will continue with the fencing of controlled grazing systems, and will also aim to establish “mind” fencing, that is, preparing the local people to consider certain areas as controlled or protected for grazing. The project team will aim to learn about rain-fed crops through experience sharing with India so that they may introduce these in Pakistan. However, the Pakistani people do not have ownership rights to desert lands, so this may pose a problem. They would also like to discuss with China on organic chicken farming, and perhaps begin to introduce some small organic chicken farms in Pakistan. They will continue to enhance forage and continue the exhibition of local products. The project team would also like to hold a mass awareness campaign with local people on taking ownership of the desert and adaptation strategies. Finally, they will invite the Minister of Science and Technology to visit the project site in the hopes that this will lead to government investment in enhancing some of the management strategies that have been developed under the project.

Comments

Dr Schaaf and Dr Thomas were pleased to see the cross-fertilization of SUMAMAD projects and encouraged this knowledge and experience sharing to continue to see if these experiences will be successful in different locations. Engr. Soomro also noted that he would like to bring back to Pakistan the “pumping bicycle” system that was seen at the irrigation fields in Burkina Faso. Prof. Gabriels asked whether the supplemental irrigation will continue

next year, to which Engr. Soomro confirmed that it would. Prof. Gabriels suggested further exploring deficit irrigation through the partner site in Bolivia.

d) Gaoming Jiang, Hunshandake Sandlands, China

Prof. Jiang indicated that they would continue to investigate the growth pattern of free range chicken in the grassland. They would also study the response of different plants and biomass to the addition of water and fertilizers, and study the water movement (sap flow dynamics) of the dominant tree species in the sandlands. They would also like to explore the potential for carbon sequestration in the natural grasslands. Prof. Jiang indicated that they would like to study the effects of introducing chicken farming to the local culture, and would assist the local people in obtaining organic certification for the chicken and milk tofu products. The national seminar will focus on establishing the largest eco-husbandry site in the region, and this proposal will be discussed with different levels and stakeholders. Prof. Jiang would also like to explore options for using the China case study in the emerging dialogue on sustainability science.

Comments

Dr Thomas commented that the rehabilitation of grasslands through an alternative livelihoods approach is extremely important for decision-makers and has a huge potential for being scaled up as the majority of drylands are grasslands or rangelands. This also means that there is enormous potential for carbon sequestration, also in terms of political motivation, and especially for China as one of the world's largest CO₂ emitters. Dr Thomas encouraged the project team to explore these potentials.

e) Mohamed Ouessar, Zeuss-Koutine Watershed, Tunisia

Dr Ouessar indicated that most activities have already been initiated through the ongoing research of graduate students. The impacts of acacia plantations on the soil and micro-climate will continue to be investigated. In collaboration with the Ministry of Agriculture, they will conduct an evaluation of 10-15 years' worth of experiments on recharge wells. They will continue to develop decision-making systems on the potential impacts of climate change in the southern parts of Tunisia and will work on this in collaboration with the Olive Institute and Ministry of Health. They will continue to pursue the expansion of eco-tourism opportunities and move towards changing the local laws.

Comments

Dr Thomas noted the importance of assessing the recharge work for the drylands of the region, and noted the spin-off project that has emerged on this in the United Arab Emirates. Dr Thomas encouraged the project team to move ahead with this and to begin to involve policy-makers in the recharge work by presenting them with the results. Prof. Gabriels also asked that more emphasis be given to the evaluation of the research being done on recharge wells.

f) Abdullah Al-Klob, Dana Biosphere Reserve (DBR), Jordan

Mr Al-Klob indicated that they have four objectives for the following year based on the work that has been done in the previous years. They plan on regulating grazing through the development of a rangeland management plan, applying the management plan and the monitoring and evaluation system. They will also initiate capacity building activities for the Barret Dana Cooperative staff on livestock and rangeland management, including targeting women livestock owners which will also feed into the development of alternative livelihoods of the local community. They will explore options for reducing grazing pressure through a "green" production of fodder using wastewater from a local cement factory. Finally, they will continue to raise awareness with local stockowners in environmentally-friendly practices.

Comments

Dr Schaaf encouraged the project team to explore developing scenarios for long-term future work and to think about providing guidance or advice to local communities or local officials. Mr Al-Klob indicated that they are working on a case study with an expert from the El Mujib Biosphere Reserve in Jordan to demonstrate the benefits of the DBR and its potential for replication in other areas.

g) Dr T.K. Bhati, Arid Western Plan Zone (Thar Desert), India

Dr Bhati indicated that the focus of 2012 project activities will be on 'runoff farming' (water harvesting) and on construction of contour bunds. He also indicated that in relation to the first project objective, they will continue to strengthen the research on monitoring and evaluation for soil and water conservation in the two sites. With the addition of two plant ecologists, they will also strengthen the component on plant biodiversity. In terms of policy guidance and advice, they will look at developing scenarios for the use of sacred lands as reserves and encroachment to be regulated. They will also explore options for making the traditional farming systems sustainable for marginal farmers, and offering these to different local communities through a micro-finance option. Further policy work will be done on groundwater recharge. In terms of livelihoods, the project team will explore developing a composting model for farmers based on the cutting of vegetation before the monsoon season. The national seminar will explore scenarios for rehabilitation of degraded rangelands, and the sustainability of livelihood-support systems.

Comments

Dr Schaaf commended the ambitious programme for the next year which is possible through the support of the large parent institute (CAZRI) backing the project team. Prof. Gabriels suggested that for the wind and water erosion modeling, the project team focus on the data collection aspect.

h) Jean-Noel Poda, Mare aux Hippopotames Biosphere Reserve (MHBR), Burkina Faso

Dr Poda indicated that the main focus of the work next year would be on ensuring that the fishing activities in the MHBR are sustainable. They would also focus on agro-forestry innovation for adaptation in the context of the BR. Work will continue on the development of ecological orchards as a supplement to cotton production, and low wood production by the local population and women in particular will be encouraged for sustainability and biodiversity conservation. They will also work on developing education kits for schools as there are many schools and institutes in the BR that focus on biodiversity conservation.

Comments

Prof. Gabriels commended the work being done, especially with regards to the improvement of livelihoods of local people, and encouraged the continued involvement of local populations.

3.5. Final Reflections and Conclusions

In wrapping up the workshop, Dr Thomas remarked upon the importance of describing impacts, both positive and negative, and asked project teams to bear in mind their activities in relation to an impact pathway in order to link this to an intervention logic. With the project now moving into its final phase and the final project evaluation looming, it will be important to be able to show to the evaluators what the impact pathway has been. Dr Thomas offered for UNU-INWEH to help each country to develop its impact pathway, with the country partners

identifying the key constraints. He indicated that these could be included in the final reports and the policy brief.

Dr Herman supported the idea of a common approach to demonstrating impacts. He explained that identifying the impacts of the project, both locally and regionally, will be a main focus of the final evaluation which will additionally look at the potential impacts at a larger scale, internationally and globally. This will also be of benefit to the country partners. Dr Herman indicated that by the end of the year, they should have an idea of when the evaluation will take place. It will be up to the evaluators to decide whether they will visit any of the project sites. Dr Herman emphasized the importance of these evaluations in obtaining future financial support from governments.

In response to a request for feedback on what should be presented or focused on in the final reports, Dr Herman and Dr Schaaf advised country partners to focus on presenting a few in-depth activities which are specific to each country site and where concrete results and achievements can be presented. They highlighted focusing on any training, networking or cross-fertilization activities that have taken place, as the evaluators will consider knowledge transfer and potential for replication, two areas which are especially important to the overall SUMAMAD project.

Dr Schaaf closed the workshop by thanking all country partners for their participation and presentations. He warmly thanked Dr Poda, Mr Dibloni and their team for the excellent organization of the workshop and for their warm hospitality during the participants' stay in Burkina Faso.

3.6. Field visits and Celebration of the 40th Anniversary of the UNESCO MAB Programme

a) Field visits

Workshop participants were treated to a number of field visits. On 15 December, en route to Bobo-Dioulasso from Ouagadougou, participants visited flood irrigation and drip irrigation fields, observing the local techniques being used in each. Participants also visited a sacred crocodile lake where they learned of local customs. On 18 December, participants visited the protected forest area of Kou at Nasso, 20 km west of Bobo-Dioulasso, a designated eco-tourism site run by PAGREN (The Support Project for the Participative Management of Natural Resources in the Hauts-Bassins Area). Workshop participants met with members of the Forest Management Group and were given a guided tour within the forest where they learned of PAGREN's activities and management of the forest. Later in the day, participants were taken on a guided tour of the traditional quarter in Bobo-Dioulasso.

On 18 December, workshop participants were invited to visit the SUMAMAD project site at the Mare aux Hippopotames Biosphere Reserve. Boat rides were organized on the lake from which hippopotamus could be observed. Workshop participants were also informed on the limnological aspects of the lake which had receded in recent years and whose salinity level had increased. Apart from eco-tourism, fishing is an important source of income for the local communities but a reduction in fishing stocks, likely caused by overfishing, has been noted. SUMAMAD workshop participants advised that the use of different size fishing nets be considered that would prevent the premature capturing of young fish.

Moreover, workshop participants were given the opportunity of visiting a community centre with a local radio station for the diffusion of social, cultural and environmental news. The community centre also houses a small museum with products and animal species from the biosphere reserve. Particular highlights of the field trip also included a ceremonial

performance of traditional masks and the staging of a theatre play by school children to raise environmental awareness among the local community.

b) Celebration of the 40th Anniversary of the UNESCO MAB Programme

Workshop participants were invited to attend the celebrations in honour of the 40th anniversary of the UNESCO Man and the Biosphere Programme. The celebrations took place at the Forestry University of Bobo Dioulasso, and were attended by the following representatives:

- The Minister of Secondary and Higher Education, President of the UNESCO National Commission in Burkina Faso
- The Minister of Environment and Sustainable Development
- Mayor of Bobo Dioulasso
- Focal Point for the National Committee of the MAB Programme of Burkina Faso
- Representative from UNESCO
- Representative from UNU-INWEH
- Representative from the Flemish Government of Belgium

Following the opening ceremony, a presentation was made by Dr G. Edouard Bonkougou, an agro-forestry expert, who provided an excellent overview of the forestry situation and its challenges in Burkina Faso. Following the presentation, workshop participants enjoyed lunch at the governorate of the Hauts Bassins.

3.7. Follow-up Actions

The following follow-up actions were agreed upon during the workshop:

- The 2010 Proceedings from the International Workshop held in Alexandria (Egypt) will be produced shortly by UNESCO.
- Instead of separately publishing the Proceedings of the 2011 International Workshop (Bobo Dioulasso, December 2011) and the 2012 Proceedings of the International Workshop (to be held in Bolivia in November 2012), one overall and final SUMAMAD Publication will be produced for mid-2013, which will be available for the final international workshop/conference under Phase 2 of the SUMAMAD project.
- The 2011 progress reports will be made available online in a non-print version. The presentations from the Phase 2 International Workshops will also be put online. Country partners are asked to please submit their power point presentations to UNESCO.
- Manuscripts for the final SUMAMAD publication will be submitted to UNESCO in November 2012.
- This final scientific publication will be accompanied by a policy brief for Phase 2. The development of the policy brief will be led by UNU-INWEH in close collaboration with UNESCO.
- UNESCO and UNU-INWEH will draft an outline for the chapters for the final publication and policy brief, and will share this in due course with country partners for their feedback.
- UNESCO will work together with the Universidad Mayor de San Andres to organize the 10th International Workshop in Bolivia for November 2012.
- Country partners will submit a 1-2 page summary report prior to the workshop in Bolivia in November 2012 (tentative dates: 12-16 November, possibly to include a weekend to benefit from reduced air travel fares).
- The final Phase 2 workshop will take place in June 2013 in Belgium, to coincide with World Desertification Day (17 June)

Annex I. Workshop Agenda

Wednesday, 14 December 2011

- Arrival of international workshop participants to Ouagadougou

Thursday, 15 December 2011

- Departure by bus to Bobo Dioulasso with visits to:
 - Flood and drip irrigation fields
 - Regeneration of vegetation areas
 - Crocodile Lake

Opening Session (18:00-19:15)

Chair: Ms S. Larba Angel Oubda

- Ms S. Larba Angel Oubda, Burkinabè National Commission for UNESCO
- Mr Boubacar Cissé, Representative of the Secretariat of the UNCCD
- Dr Richard Thomas, Assistant Director, UNU-INWEH
- Dr Rudy Herman, Representative of the Flemish Government of Belgium
- Dr Thomas Schaaf, Chief of Section, UNESCO, MAB Programme
- Prof. Hassanata Millogo/Kone, Secretary-General of the Ministry of Scientific Research and Innovation of Burkina Faso

Friday, 16 December 2011

Session 1: Presentation of project activities by national team leaders (9:00-11:00)

Chair: Dr Rudy Herman

- Dr Jean-Noel Poda (Burkina Faso): Mare aux Hippopotames Biosphere Reserve
- Prof. Gaoming Jiang (China): Hunshandake Sand area
- Prof. Boshra B. Salem (Egypt): Omayed Biosphere Reserve
- Dr T.K. Bhati (India): Arid Western Plain Zone, Thar Desert

Coffee/tea break (11:00-11:20)

Session 1 (continued) (11:20-12:30)

- Engr. Zamir Ahmed Soomro (Pakistan): Lal Sohanra Biosphere Reserve and Cholistan Desert
- Mr Abdulla Klob (Jordan): Dana Biosphere Reserve
- Dr Mohamed Ouessar (Tunisia): Zeuss-Koutine Watershed
- Mr Jorge Cusicanqui (Bolivia): Bolivian highlands

Lunch (12:30-14:00)

Session 2: Technical issues and future project activities (14:00-16:00)

Chair: Dr Thomas Schaaf and Dr Richard Thomas

- Open discussion on technical issues regarding project implementation and future project activities as relevant in 2012

Coffee/tea break (16:00-16:15)

Session 3: SUMAMAD Linkages with other projects; Introduction to Mare aux Hippopotames Biosphere Reserve (16:15-17:30)

Chair: Dr Jean-Noel Poda

- Dr Jean-Noel Poda: Introduction to the Biosphere Reserve Mare aux Hippopotames

Saturday, 17 December 2011

Celebration of 40 years of the UNESCO MAB Programme

Organized under the patronage of H.E. the Minister of Secondary and Higher Education (MESS) and in collaboration with the Ministry of Environment and Sustainable Development (MEDD), the Ministry for Scientific Research and Innovation (MRSI) the SUMAMAD Project, the UNESCO National Commission of Burkina Faso (CN/UNESCO), the National Committee of the UNESCO Man and the Biosphere (MAB) Programme of Burkina Faso, the National Centre of Scientific and Technological Research (CNRST) of Burkina Faso, the National School for Water and Forests (ENEF) of Dinderesso, the Support Project for the Participatory Management of Natural Resources (PAGREN), the Polytechnic University of Bobo Dioulasso, and the National Office for Protected Areas (OFINAP).

Opening Celebration (9:00-10:00)

- Focal Point for the National Committee of the MAB Programme of Burkina Faso
- Director of the *École Nationale des Eaux et Forêts* (National School for Water and Forests) of Dindéresso
- Representative of UNESCO
- Representative of UNU-INWEH
- Representative of Flemish Government of Belgium
- Representative of UNCCD
- Secretary-General of the UNESCO National Commission of Burkina Faso (SG CN/UNESCO)
- Minister for Secondary and Higher Education and Scientific Research, President of the UNESCO National Commission of Burkina Faso

Presentation by Dr G. Edouard Bonkougou (10:00-11:00)

Visit to PAGREN activities at Nasso (11:00-12:00)

Visit to the Polytechnic University of Bobo Dioulasso (UPB) at Nasso (12:00-13:00)

Lunch (13:00-15:00)

Sunday, 18 December 2011

One day field trip to Mare aux Hippopotames Biosphere Reserve

Welcome and meeting with local stakeholders (8:30-10:00)

- Welcoming words by the representative of AGEREF, Mr Zossoum Millogo.
- Statement by the protected area manager
- Statement of the UNESCO-MAB National Committee Focal Point

Visit of the Biosphere Reserve (10:00-13:00)

- Intervention by the pupils of Bala
- Intervention by the women, and by the scientists and technicians in the field of development
- Discussion, moderated by the Prefect of Satiri
- *Lunch, local festivities, and return to Bobo Dioulasso (13:00-15:00)*

Technical and financial partners:

CN/UNESCO, CNRST, UPB, DGEF, OFINAP, PAGREN, ENEF, UNESCO-MAB National Committee, Cooperation of Flemish Government of Belgium and Luxemburg, SUMAMAD, other projects and conventions.

Monday, 19 December 2011

- Return of participants to home countries (bus ride from Bobo Dioulasso to Ouagadougou/Airport)

Annex II. List of Participants

1) SUMAMAD Country Participants:

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