Scientific Report to COST

Action ES1104

Training School 4
Indicators of Desertification: early warning signs

19 – 23 May 2014 – Faculty of Sciences University of Lisbon, Portugal

Organized by Cristina Branquinho (Faculty of Sciences University of Lisbon) and Lúcio do Rosário (Portuguese Focal Point of UNCDD)

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1) The trainees
There was 46 applications to this TS, about 6 were not eligible. The criteria used were scientific based on their CV, their country of residence in order to have participation from different countries, the fact that the country of origin could be a develop country, the gender equilibrium and the fact if already had previous benefit or not from this cost action. From the application of that criteria we selected 17 trainees using the above criteria having a grant and plus 8 national trainees without a grant since their residence was Lisbon making a total of 25 trainees.

2) Filming classes and field trip

From the classes to the field trips this training school was recorded in video which can then be available for much more people and can be disseminated in different languages.

3) Description of the TS
The framework of this TS was based on the fact that desertification is an important threat to the sustainability of human wellbeing, and many countries most seriously affected by it are also the least developed. Evaluation of the impact of measures taken to control and mitigate desertification is therefore a priority issue. This training school focused on indicators of desertification, including those recommended by the United Nations Convention to Combat Desertification, and other techniques developed as early warning tools.

Early warning indicators allow the prevention of desertification before it becomes irreversible. Ecological indicators can inform us about the health of dryland ecosystems and how close they are to a tipping point. In this training school we showed how ecological indicators based on plant and lichen functional diversity were applied as early warning indicators of desertification. In addition to classroom lectures, there was practical classes and field trips to desertified areas which demonstrated the most important methodologies for assessing desertification indicators. Each student presented

a short power point about the needs of their country in terms of indicators of desertification and received comments on how to apply them.

4) Organizers and trainers

The training school was organized by Cristina Branquinho, expertise in plant ecology and ecological indicators from the Faculty of Sciences, University of Lisbon and Lúcio do Rosário, National Focal Point of UNCDD, from the Institute for Nature Conservation and Forests in collaboration with other trainers both from local and foreign research institutes namely:

Célia Gouveia expertise in climate and remote sensing from the Faculty of Sciences, University of Lisbon; Maria João Pereira, expertise in climate and geostatistics from Instituto Superior Técnico, University of Lisbon; Pedro Pinho, expertise in ecology and geostatistics from Instituto Superior Técnico, University of Lisbon; José Sousa Uva, expertise in the national forest inventory and collaborator of Institute for Nature Conservation and Forests; Gabriel del Barrio, expertise in ecology of drylands and indicators of desertification from the Experimental Station of Arid Zones (CSIC), Spain; Alice Nunes, expertise in functional plant ecology from the Faculty of Sciences, University of Lisbon; Paula Matos, expertise in functional lichen ecology from the Faculty of Sciences, University of Lisbon; Tomás de Aquino Figueiredo, expertise in soil sciences from, School of Agriculture Sciences in Bragança, Portugal; Maria Nazaré Roca, expertise in social and geography sciences from, New University of Lisbon; Manuel Rebelo, expertise in restoration and reforestation projects in drylands, from Institute for Nature Conservation and Forests; Graça Oliveira, expertise in plant restoration ecology, Faculty of Sciences, University of Lisbon; Teresa Mexia, expertise in restoration ecology, from Faculty of Sciences, University of Lisbon; Laura Concostrina, expertise in biological soil crust ecology from Faculty of Sciences, University of Lisbon.

5) Program Resume

Day 1
Cristina Branquinho
Introduction to Indicators of Performance & Ecology of Semiarid and Ecological Indicators
Students were introduced to the need for indicators; the different types of indicators and what they should be used for; the indicator models used by different organizations (UNCDD, OCDE, EPA, EEA); the advantages and limitations of using ecological indicators; and the theory and practice of using early warning indicators.

Lúcio do Rosário
Introduction to the UNCDD Indicators
The indicators of the UNCDD were explained, and the trainees were introduced to their main limitations.

José Sousa Uva
The Portuguese National Forest Inventory: Applicability in semiarid areas monitoring
Portuguese forest inventory was used as an example of the importance of obtaining data on land cover over time to evaluate trends in desertification and ecosystem processes.

Alice Nunes, Paula Matos & Laura Concostrina
Methods for measuring plant, lichen and biological soil crusts functional diversity
In preparation for the field trip on day 3, the basic ecology of semi-arid areas was presented together with the most important methodologies for assessing the functional diversity of plants, lichens and biological soil crusts.

Pedro Pinho
Measuring productivity and phenology in semiarid areas through remote sensing
A case study of a Savanah like system was presented since in some ecosystems it is possible to interpret seasonal patterns in order to obtain productivity and phenological trends in space and time.

Maria João Pereira
Quantifying desertification trends using remote sensing data
Different approaches to the use of remote sensing information, for evaluating trends in desertification in Mediterranean Europe, Africa and South America will be presented.

Day 2
Gabriel del Barrio
Calculating the Aridity indexes
Students were introduced to the application and development of the aridity index for different countries, the temporal and spatial resolution of this indicator, and methods for calculating it in a practical lesson.

Célia Gouveia
Meteorological, hydrological and drought indicators
An overview was given to other meteorological indicators associated with droughts and desertification.

Tomás de Aquino Figueiredo
Indicators of desertification based on soil
Skills for evaluating soil quality will be developed together with an explanation of the most important methods for applying them in the field.

Day 3
There was a field trip to a desertification gradient, starting in the more coastal areas and ending in the interior where the most desertified areas in Portugal are located. There will be practical demonstrations of methods for assessing indicators of soil quality, plant

diversity, lichen diversity and biological soil crusts, visits to restoration projects where mitigation measures to combat desertification have been successfully applied.

Day 4
Alice Nunes, Paula Matos & Laura Concostrina
Results from measuring plant, lichen and biological soil crusts functional diversity
The use of early warning indicators will be addressed by showing the results of the Desertwarning project concerning the diversity of plants and lichens.

Manuel Rebelo
Impact assessment of afforestation
Demonstrated examples of restoration measures carried out in Portugal during the last 30 years; Impact assessment of afforestation in water, soil and biodiversity conservation in areas susceptible to desertification.

Maria de Nazaré Oliveira Roca
Demographic Sustainability and Desertification
Social and economic indicators for research and policy design to combat desertification; Presented the concept of demographic sustainability; The SUSTAINDEMO model; Spatial typology of demographic sustainability

Sergio Chozas
Soil organic matter drives xerophytic shrub community
Indicators based on plant functional diversity to determine conservation areas.

Teresa Mexia
Indicators of ecological restoration
Indicators of restoration success based on plants and animals.

Field Trip
Graça Oliveira
Quarry Restoration at Secil-Outão
Field trip to visit restoration projects and presenting in vivo different techniques for restoration that were implemented on the last 15 years.

Day 5
The day was devoted to the trainees giving presentations about the application of indicators in their countries, and the associated challenges and limitations. The training school coordinators gave practical advice on the application of desertification indicators in their country of origin of the trainees.

6) Linkages for the future

During the presentation of the trainees a series of topics came up as the ones that would interest several of the participants in the TS for future projects and bilateral relations, those were compiled and are presented here as the topics that connect these group of people:

i. Disentangling the several aspects of carbon in soils
ii. Geochemistry of contaminated soils
iii. Management of riparian vegetation in drylands
iv. Indicators of OCDE and UNCDD
v. Remote sensing and ground truth validation on information on drylands ecology
vi. Revegetation, reforestation, restoration of drylands
vii. Soil erosion quality and agriculture in drylands
viii. Soil quality and fires
ix. Transdiciplinary approaches to restoration in drylands

The information about the presentations of this training school can be found in the following links:
Training school in Indicators of Desertification
http://ecofun.fc.ul.pt/Activities/Desertification2014