GBEP Working Group on Capacity Building for Sustainable Bioenergy (WGCB)

Activity Group 5
"The Global Atlas for Renewable Energy - Bioenergy Component"

Bonn, Germany, IRENA Offices, 2-3 July 2014

The main objective of this Activity Group 5 (AG5), established in May 2013 under the leadership of IRENA, was to develop guidance on how to interpret and use maps in light of the GBEP Sustainability Indicators and also to incorporate a component of the efforts on building the capacity of developing countries/institutes to use mapping as a tool to support good policy development.

The Activity Group 5 met in Bonn on 2-3 July 2014, kindly hosted by IRENA. Argentina, Brazil, Cambodia, France, Germany, Indonesia, Japan, Paraguay, European Commission, FAO, IRENA and UNEP participated in the meeting as members of the AG5. Speakers from Utrecht University (The Netherlands) and University of KwaZulu-Natal (South Africa) also participated.

Dolf Gielen, Director of the IRENA Innovation and Technology Centre in Bonn, and Maria Michela Morese, GBEP Executive Secretary, welcomed the participants respectively highlighting the importance of the Global Bioenergy Atlas and the key role of GBEP regarding the sustainable development of bioenergy.

Within the ***"Introduction and background"*** session, *Nicolas Fichaux*, leader of the AG5 (IRENA), gave an overview of the Global Bioenergy Atlas under development by IRENA and of the objectives of the AG5 meeting. *Martina Otto* (UNEP) followed elaborating on opportunities and limitations of mapping, while *Floor van der Hilst* (Utrecht University, The Netherlands) gave an overview of the state of the art on approaches and methodologies employed in the bioenergy resource assessments, as well as provided an outline of a methodological framework that captures key factors that determine biomass resource potentials and sustainability.

Session 1 – Guidance on how to use and interpret maps on bioenergy resources

This session, moderated by *Nicolas Fichaux* (IRENA), was aimed at receiving examples of how relevant is geospatial information to map sustainability aspects of the potential bioenergy production; what geospatial data can better help identify or illustrate the risks for sustainability; and minimum requirements that could be foreseen to identify if a sustainability aspect was adequately illustrated by a map.

Shunichi Nakada (IRENA) elaborated on the spatial variability of natural resources, and inconsistencies between biomass supply potential and demand. Furthermore, he highlighted potential implication of spatial variability to sustainability perspectives. He also reviewed the current GIS application (assessment for "biomass potential", "impact of biomass use to sustainability", and "optimal use for bioenergy application") and discussed about limitations and future needs.

Helen Watson (University of KwaZulu-Natal, South Africa) shared lessons learnt from developing and using bioenergy resource maps in Africa, such as importance of scale, ideal data versus real data and the importance of underlying assumptions. She also reviewed three studies that aimed to identify areas suitable for rain-fed sugarcane production in Tanzania.

The sustainability risk of the areas identified as suitable and available for bioenergy crops were suggested to be determined using a common GIS based methodological framework. When identifying areas suitable for rain-fed bioenergy crops, in addition to assessing rainfall, temperature, soil and topographic data, ideally long term climatic data was recommended to be analyzed using water balance and crop models so that the actual evapotranspiration, length of growing period, and potential crop and biomass yields of each grid cell, can be estimated. When identifying areas available for these crops it was also recommended to exclude protected areas, areas currently being used for food and/or cash crops, as well as for grazing. Once areas are identified as both suitable and available for bioenergy crops their potential sustainability risk was recommended to be assessed by determining their proximity to (i) water bodies and suitable sites for dam construction, (ii) infrastructure (roads, railways, electricity grids), (iii) population density, literacy and poverty levels, and (iv) existing bioenergy processing and storage facilities, and utilization nodes. Such an analysis was presented as necessary to enable prioritization of the areas for conversion to bioenergy crops.

*Takashi Hayashi (*Policy Research Institute, MAFF, Japan) show usefulness of GIS to assess the GBEP indicators. He explained how the GIS can be applied to measure sustainability of bioenergy, and introduced the results of two specific researches which apply GIS to sustainability assessment with case studies in China and in Japan.

Ilaria Rosati and Mario Bloise (FAO, GAEZ) gave an overview of the Global Agro-Ecological Zones (GAEZ) database that provides the agronomic backbone for various applications including the quantification of land productivity. This new database makes publicly available many terabytes of data covering five thematic areas:

- Land and Water resources, including soil resources, terrain resources, land cover, protected areas and selected socio economic and demographic data;
- Agro-climatic resources, including a variety of climatic indicators;
- Suitability and potential yields for up to 280 crops/land utilization types under alternative input and management levels for historical, current and future climate conditions;
- Downscaled actual yields and production of the main crop commodities;
- Yield and production gaps, in terms of ratios and differences between actual yield and production and potentials for main crops.

In the new GAEZ Data Portal there is an interactive data access facility which not only provides free access to data and information and allows visualization of data, but also provides the user with various analysis outputs and download options.

Ana Kojakovic (FAO, BEFS) gave an overview of the Bioenergy and Food Security Approach that assists countries develop the evidence based upon which to detail policy decisions and the sustainable bioenergy policy. Bioenergy mapping was highlighted as to support the country level assessment process and form a building block of the policy formulation process. The methodology used is based on the Agro-Ecological Zones methodology developed by FAO and IIASA and also accounted for environmental protected areas and other delimited areas. During the presentation, she also gave an overview of maps developed within the BEFS project for Tanzania regarding agro-ecological zoning and production potentials of sweet-sorghum.

Bruno Neves (FGV, Brazil) presented the FGV Agricultural Zoning Methodology, its assumptions and considerations for application at a national level. He also highlighted the relevance of social, economic and environmental aspects in the definition of the context of interpretation of maps, as well as the main constraints faced in generating a good spatial

database. He finally shared the FGV experience in Mozambique, highlighting the difference between the results generated by the zoning of two works in two different contexts, where adding new level of details allowed the expansion of the scope of the analysis and the generation of relevant information to assess sustainability and make recommendations.
Jan Seven (Federal Environment Agency, Germany) and *Susanne Köppen* (IFEU, Germany) elaborated on some major issues related to 'matching/adapting' GBEP indicators to mapping requirements considering their limitations. They shared views on limitations to represent sustainability via mapping using various GBEP indicators as concrete examples.

Session 2 – Methodological Framework to reflect/access GBEP Sustainability Indicators in the Global Atlas

During this session participants were divided into three parallel sub-groups, one for each of the three pillars of the GBEP Sustainability Indicators (Environmental, Social and Economic), with the aim to identify: indicators that would be more relevant to the mapping exercise and which can be related to map-based information; how far datasets inform different GBEP indicators; the minimum scale required for a dataset to illustrate a measurement of indicator on a map; the variability over time that would require regular updates; and what data would be required or is recommended.

The three sub-groups came out with similar conclusions related to the fact that the themes dealt into many GBEP sustainability indicators are not suitable to be represented in a map. The GIS information is not the indicator in itself, but displays intermediate calculations or analyses performed in support of the assessment process. Useful information to assess the indicators include land cover, land use and protected areas, land suitability/availability/productivity, slope, altitude, roads, population density, local infrastructures, etc.

As a consequence the Activity Group 5 further discussed the links between mapping and the GBEP sustainability indicators, and instead of working on a top-down approach - interpretation of existing collected maps on the basis of the GBEP sustainability indicators - proposed and agreed to work on a bottom-up approach: development of guidance for users on limitations, as well as collection of supporting datasets and best practices, regarding the mapping for each of the 24 GBEP sustainability indicators. The various elements collected would benefit from being presented through a knowledge platform.

Conclusions and next steps

The Activity Group 5 recognized the importance to measure the GBEP sustainability indicators as a set, and that only through measurement of all 24 indicators a full sustainability assessment of bioenergy production is possible. The AG5 recognized that for many GBEP sustainability indicators mapping is not feasible. In light of the above and considering that it would not be appropriate to map only few indicators as this will not give a full picture of the sustainable production of bioenergy, the AG5 agreed to modify its current scope of work.

The AG5 decided to work towards the development of guidance for users on limitations, as well as collection of best practices, regarding the mapping for each of the 24 GBEP sustainability indicators. As such, maps would be used as a tool to better understand the bioenergy production, but not with prescriptive/directional approaches and not as a definitive decision support mechanism for policy-makers.

To this end IRENA, leader of the AG5, proposed to work on a new scope of work accordingly, to be shared among the AG5 members in view of the next GBEP meetings to be held in Rome (FAO HQs) mid November 2014.