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Title: Information systems, decision support in the Democratic Republic of Congo and the fight against bushfires

Introduction

The main purpose of this study that we conducted in the DRC is to show agricultural stakeholders, policy makers, and the local population and the environmental information system is an important tool for decision support.
This system is designed by ANEE for the DRC, as a tool for advocacy and monitoring the state of the environment and its development in the agricultural and energy sector. This communication highlights the contribution of environmental information, sustainable development and specifically address the following issues systems: "What types of information systems can promote sustainable development in the agricultural sector of the Congo? ". It raises and provides some answers to various problems with the links to good forest governance, in terms of diagnosis and assessment of sustainable development, environmental impact assessments, environmental education, forest ecosystems and agricultural training.

1. Briere description of DR Congo

At the heart of Africa, the DRC is four times as big as France, populated by some sixty million people and has one of the richest in the world's soils. The country has undergone five internal armed conflicts and foreign invasions. More than four million people in less than a decade, most decimated by hunger and disease because of the fighting.

DR Congo is the second country in Africa after Algeria in terms of its area. It stretches from west to east by the Atlantic Ocean and the plateau to the east. It is crossed by the River Congo. North of the DRC, there is the rainforest; Eastern DRC borders the Rift Valley of Africa, an area of mountains, layered forest, hills, lakes but also volcanoes. The south and center field savannas form a plateau rich in minerals. In the far west, forty kilometers north of the mouth of the Congo River spans a coast on the Atlantic Ocean, an area of mangroves. The country shares its border with limits Cabinda (Angola) and the Republic of Congo Brazzaville west, CAR and Sudan to the north, Uganda, Burundi, Rwanda and Tanzania to the east , Zambia and Angola to the south.

2. Environmental issues and context of agriculture in DR Congo

The agricultural sector has been declining for two decades leading to chronic malnutrition of its population. Agricultural GDP per capita and 40% decrease between 1990 and 2000. Food insecurity currently affects approximately 76% of the Congolese population and the DRC imports more than 40% of the food it consumes. However, agriculture is the main economic activity of the country, representing about 40% of GDP, nearly 70% of the Congolese population spends.

Traditional agriculture represents 90% of national agricultural production. A subsistence agriculture of rural households and peri-urban areas, and a small part is for sale. It is dominated by the practice of slash and burn shifting cultivation on a small area (1.5 ha per household on average), no particular provision of agricultural inputs or in combination with farming systems. It is also characterized by the use of rudimentary tools. Attempts to use draft animals to replace these simple tools have been unsuccessful. The following agricultural productivity of traditional farming is low, and increases the precariousness of households. In addition, little infrastructure currently in place (road but also processing and storage of products) is not conducive to the increase of production as land insecurity hampers investment. Modern agriculture mobilizes modern production technologies in sectors for export: coffee, palm oil, rubber, cocoa, mainly. This type of agriculture has declined greatly in the last decade, due to armed conflict, deteriorating infrastructure of production, but also the collapse of prices of certain agricultural products on the international market. While agricultural exports were estimated at nearly 334 million USD in 1995, they were only 4.3 million in 2003. This contrasts with the strong potential of the country in agriculture. The DRC has about 80 million hectares of arable land, 34% of the country which only less than 10% are currently developed, and large reserves of freshwater and diverse eco-climatic conditions favorable to agriculture. While the irrigation potential is estimated 4 million hectares, the total irrigated area is only 10,500 ha. The fisheries potential is estimated at 707 000 tonnes of fish annually.

3. The environmental management in the DRC

Based on these observations, the DRC has ratified the main international conventions on the environment and supports the sustainable development initiatives such as statements of Rio, Johannesburg and Agenda 21. DRC currently the law on the environment, which defines the National Environmental Policy and specifies the general principles and provisions translating into operational terms within the overall development. This policy aims to restore a sustainable and harmonious balance between the development needs of Congolese and ecological concerns.

Implementation of environmental policy is provided through a National Environmental Action Plan (NEAP), divided into five programs each year. The NEAP main aims to reconcile the population with its environment for sustainable development. ".

Different instruments of environmental management are developed and implemented within the NEAP: transfer management, protected areas and conservation sites, integrated coastal

management, conservation management of water and soil, sustainable management of forest resources, development investment compatible with the environment, regional planning, land tenure security. These instruments are supported by other measures or activities primarily to reduce pressure on natural resources such as development activities or alternative outreach, education and capacity building. Finally, NAP also includes components of establishment of good environmental governance that applies almost no DRC.

In terms of environmental information system and environmental information, ANEE introduced in the DRC system to inform, raise awareness and convince the political and administrative authorities to apply management environmental scorecard national and decentralized and facilitate the exchange of information - Monitoring of marine and terrestrial ecosystems and management of data on biological diversity of the DRC and the economic development of the accounting environment.

4. Description of the Environmental Information System

Among the conditions for the success of this action, there is the accession of the sovereign people, agricultural stakeholders and authorities. They are aware of mainstreaming the environment in the planning process and the need to improve the tools of control of the changing environment in agriculture, energy in the DRC, including the use of technical awareness, awareness, information and training and the introduction of indicators taking into account the evolution of the natural capital in time and space.

a) The purpose of the Environmental Information System

The environmental information system in the DRC is the tool designed to monitor the state of the environment and its evolution, allowing a greater awareness of the actors in the socio-economic, agricultural and energy environmental issues life assess the environmental impacts of different plans, programs, policies, economic activities, and to allow orientation of policy makers and the activities of the various actors in their agricultural fields. So it is better management of the environment, natural resources (fauna and flora) and a systematic consideration of the environmental dimension.

3. The system consists of:

- Gather information on environmental and agricultural issues through a thematic network and / or regional set up with various organizations and institutions working in the field of environment, agriculture and other related fields as well as actors land and other economic operators;

- Design and develop indicators for better monitoring of environmental and agricultural aspects in the Pressure-State-Response model;

- Disseminate information to policy makers, operators and the public by publishing, among other things, periodic reports on the state of the environment and the agricultural community and other publications

Presented in different formats (newsletters, worksheets, posters, etc).

- Manage sectoral observatories and databases relating thereto;

- Information on the state of natural ecosystems from the use of satellite images;
- Develop a statistical system should lead to a environmental accounting can optionally be integrated term in national economic accounting with provincial support.

b) The "design" of the system of environmental information

The environmental information system is a tool for decision support is used to fight bushfires tell which is a scourge threatening the biodiversity of the DRC. Especially since the majority peasant population practice slash and burn agriculture with short fallow. The information system becomes a tool of prevention, awareness in the DRC. The system consists of two major components which are:

• environmental indicators and

• tools for decision support (Fact sheets and other communication tools). The two components are connected by a reporting system for the placement of descriptive databases indicators for concrete products specially prepared to facilitate decision making. But in reality, an information system involves not only the indicators and provision of policy makers, it also includes tools, actors and processes. Provincial / regional environmental indicators associated with control structures and implementation of their development, the tools support the decision which are products and procedures for the collection and organization of data sources provide information systems

provincial / regional. Provincial / regional environmental indicators are also designed especially to meet the information needs at decentralized level and integrate environmental concerns specific provinces and ecoregions.

The national environmental information system then comprises the central system based in Kinshasa and the provincial environmental information systems located in the district environmental information systems.

c) Indicators

Environmental indicators have been identified in a concerted manner from the environmental contexts of the country, priority environmental issues, national environmental policy and international agreements; Thematic indicators focus on five key areas that are biodiversity, soil and vegetation cover, coastal, inland waters and climate and climate change. The five priority areas are defined in a framework of risk in the agricultural and energy sector. Two other groups of indicators are defined to take into account socio-economic factors and indicators Environment Programme. Indeed, environmental indicators include, besides the actual physical condition of the natural environment, pressures and causes pressures on natural resources, but also the responses of society to the problems or threats of environmental degradation. The methodological framework used is based on the use of the model perfected Pressure-State-Response reflecting the interaction between society and nature.

d) Environmental Performance Indicators (TBE)

The objective of TBE is to produce and distribute synthetic, reliable and accessible information to support decision-making by various actors in the political, economic and social life of the country at all levels. TBE is actually a different way of presenting environmental indicators. Its uniqueness lies in the fact that it specifically targets policy makers and economic actors at all levels, the latter requiring summary information, clear and concise in the agricultural and energy sector.

The use of summary information on the state of the environment is expected to integrate environmental management into national policies and strategies as well as in regional development plans or sector of the country.

TBE is presented in a form that allows them to quickly grasp the situation of the environment, the causes of problems and actions already implemented. TBE is a summary table organized by topic and by the trilogy pressure-state-response. Indicators are expressed through descriptors encrypted with units specified measures and compared with national or international standards, references to the area or just the goals set by the program / sectoral policies and / or provincial.

e) The System Monitoring Status of Major Ecosystems (SSEE)

The monitoring system of the state of major ecosystems (SSEE) is part of environmental information system that specifically addresses the information about ecosystems and biodiversity of the DRC in environmentally homogeneous and appropriate territorial units needs to planning and management. He was initiated in order to make available information on the status and trends of natural ecosystems. The availability and use of information should assess the state of Congolese ecosystems as a whole, to follow the impact of the work done and finally streamline and enhance the conservation and sustainable management of ecosystems.

The SSEE involves the implementation of a subset of the indicators of environmental dashboard that are related to ecosystems and biodiversity. Feeding indicators data is provided by various stakeholders and development agencies and / or working in the environmental field as a scientific   support   experts   and   specialists   in   the   field. The indicators have been selected to give the status of each ecosystem to which it applies, but also to be able to synthesize information for the general condition of all the ecosystems and biodiversity of the DRC.

f) Reports on the state of the Environment (SOE)

The REE are written reports following the international standards and practices to analyze the status and trends of the environment, resources, and human health related to the environment, which includes humans and their activities in social economic and cultural dimensions. The REE are developed with the participation of experts and specialists in the fields treated, they are structured and accompanied by detailed analysis.

The REE are generally based on environmental indicators. The areas covered are prioritized in relation to environmental concerns when the regions concerned. Thus, when it comes to reporting provinces, information and analysis are prioritized and provided by local specialists and writing parts that concern them respectively assigned. Reading committees at national and regional level are also made to ensure the quality of technical and scientific reports on the state of the environment.

g) The actors

The Ministry of Environment, Water and Forests, Ministry of Agriculture . It provides project management at the national level of site development of environmental indicators and production tables environmental edge. The National Association for the Environmental Assessment of the DRC (ANEE) is responsible for informing and strengthening capacity in the agricultural stakeholders on the environmental information system. To this end he is responsible for the implementation and management of information system. It has among its missions to design, coordinate implementation and develop the environmental information system in the agricultural and energy sector in the DRC.

The ANEE established a research consortium called PECA DRC. This institution is established in order to study the state of the environment of the DRC after wars. But also the study of agricultural, energy and environmental issues.

The PECA ANEE and formed themselves into networks of environmental information and awareness among stakeholders in the agricultural and energy sector to raise awareness among agricultural and energy stakeholders on environmental issues. To raise awareness, the experts ANEE PECA and organize the training seminar, use the media to reach the large segment of the population.

h) Management of databases and indicators

The appropriate databases are created and managed at the ANEE to store the information collected and thus constitute a computerized reporting system for the production and supply indicators and reports. These databases are organized according to themes, location and reference sites using the methodology "Pressure-State-Response". Software packages are mounted to the information systems of the provinces which are fully reproduced in the parallel run at the ANEE system work.

j) Dissemination of information

The dissemination of these tools to help the decision is made by the publication of brochures, print and publishing interactive electronic version of the documents on CD-ROM.

5. Information system and fight against bushfires

Bush fires are one of the causes of environmental degradation, the DRC estimated at 9.5 million ha per year area burned by fires. Fires are mainly due to the renewal of grazing to cleaning operations and uncontrolled mining, popular discontent, to pure vandalism or reasons related to cattle rustling.

In order to reduce forest fires, three types of activities are carried out: the awareness and motivation of the people to fight against bush fires, strengthening law enforcement against bush fires and monitoring satellite fires.

a) The proposed classification and compensation of Commons report fires
The project objective is to guide public investment in common where there is less degraded by fires through taking incentives forests. It is common to classify according to the frequency of brush fires in the respective boundaries and their impact on deforestation. The criteria are the presence of light, the existence of structures involved in the fight and the existence of dina (EU conventions). The project is implemented by the PECA ANEE DRC in collaboration with the Directorate of Forest Management Department of the Environment.

A standing committee of monitoring and evaluation of fire is considered in each province. The drafts are made by ANEE to submit to the Parliament of the DRC. This committee is responsible for classifying the Commons: Common deserving, those who provided significant efforts in the fight against the fire, and evidenced by the fact they have not been invaded by fire common encouraged those who have actively contributed to the extinction of wild fires in their territory and in which a decrease in area burned was registered; common failing, those who have not provided any effort that still need to be empowered.

Certificates of merit and good conduct certificates are available according to this classification, but the committee monitoring and evaluation can provide the competent authorities the temporary suspension of funding for projects in the failed joint. Responsibility for the management of forest management is to gather and consolidate statistics from the decentralized services of the Ministry and evaluation committees on bushfires by commune and district municipalities and certify and disseminate the results. That of ANGAP is to measure and report the DGEF the area of protected areas affected by the fires. The role of ANEE is to provide reliable and objective information based on satellite images and from the overlap of activity coefficients lights Nights and evolution of vegetation cover. To do this, the ANEE is responsible for acquiring information on the activities of night lights, acquire and process satellite images and make analyzes linking the activities of fires and forest degradation by common and finally to make the information available to the committee monitoring and evaluation and management of forest management.

b) The activity coefficient of night lights

The activity coefficient of night lights is a coefficient assigned to a given area (one or more polygons) calculated from the number of pixels containing fires detected by satellite images

taken every night. The objective is to establish a monitoring system to various stakeholders and decision makers (community, regional actors, ...) to better understand the spatio-temporal dynamics of bushfires and direct / redirect strategies on reducing fire in the politics of environmental management.

The acquisition of fire and cloud data, covering the national territory, is by observing member ANEE and locals. These data are taken every night and day when the fire is declared. Tasks include locally made treat, structure and conduct spatio-temporal analysis of the data. The historical database includes data created in vector format, it is updated periodically and cartographic outputs are available to policy makers. The activity coefficients of fires are relatively reliable but unfortunately they do not provide information on the area burned. It is therefore useful for coupling with other analyzes. Indeed, these coefficients can be exploited in many ways, but they can be particularly cross with other environmental and socio-economic information, political ...
c) The image processing and mapping

Data processing involves treating transform data statistics. The statistical data used to produce tables, graphs and thematic maps. The methodology includes data preprocessing, verification of land that can be replaced or supplemented by the taking and photo interpretation and finally the correction data. The results of the interpretation are transformed into vector format to be part of a thematic exploitable information layer with software processing of geographic information. The use of GIS allows the development of thematic maps for spatialized indicators raised. The process allows to monitor the area of natural ecosystems (vegetation, water areas, mangroves, reefs, etc..) As well as the development and impacts of erosion (sanded surface, new bed, etc.). But especially bushfire in different seasons of the DRC.

Conclusion
The system presented here proves to be an indispensable tool for the eradication of bushfires incentive tool and contributes significantly to the promotion of sustainable development. Indeed, there will be no sustainable development if we continue to destroy the natural capital at the current rate.

It is noted, however, that ANEE continually faced with material, financial and technical constraints. Enhancements of capabilities are necessary and to the extent that this fight against fires is a long process, involving national and national institutions is essential. Otherwise, the impact of this kind of action can not be sustained.

In addition, to prevent bush fires and slash and burn agriculture, 75% of the population formed and informed avoids the practice in their daily lives.

Looking ahead, ANEE plans to upgrade its system into a sustainable development observatory and followed the distribution site hosted with bushfire in the DRC.