**EA processes as a tool to integrate CC in decision**

**Introduction**

Climate change (CC) creates negative perverse impacts requiring appropriate action. However, populations and productive systems in many developing countries are highly dependent on natural resources and often have a relatively limited adaptive capacity. Rain –fed agriculture in these countries is more dependent on the climate. As a result, these countries are often among those most affected by climate change. While the need for action has been clearly recognized by the entire development community, the debate on how to integrate climate change into the development practice and initiatives still has a long way. Environmental assessment (EA) thus appears as a tool for integrating climate change into decision-making. Indeed, the impacts of global warming on territories, resources and lifestyles are unprecedented and still poorly controlled. Least developed countries (LDCs), developing countries and small island states are the most affected with the increase of natural risks and disasters, water stress, desertification, rainfall modification.

In the francophone countries of sub-Saharan Africa (SSA), the situation is quite complex because of many bottlenecks. There are many impediments to the integration of the issue of climate change in the EA processes:

- Poor knowledge on the topic and uncertainty about the local impacts of climate change;

- The thorny problem of funding for adaptation (insignificant in agricultural domain);

- The fuzzy limit between development and adaptation;

- The difficulty of analyzing vulnerabilities and adaptive capacity locally (because of illiteracy, lack of sensitation and capacity building);

- The real control of EA processes itselves by governments and NGOs.

Nevertheless, this paper will take support on three main situations both theoretical and practical.

**Development planning documents and reports**

Theoretically, the Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment (2003) stated that the EA practitioner should carry out an in-depth analysis of the CC's range of impacts and determine the level of confidence that may be attributed to the data. Integrating CC considerations into EA can help determining the project's compliance with GHG measures, including NAPA and government plans on CC. In addition, this integration can help proponents adopt best practices that promote and facilitate adaptation to CC impacts, including changes in the frequency and intensity of extreme weather events, average temperature rises, and changes in rainfall patterns. However, even if greenhouse gas (GHG) emissions were massively reduced in the near future, changes in climate conditions will continue to occur and the extent of their impacts will increase significantly in the future. This is the reasons why we are emphasizing on three main practical cases.

**Strategies, plans and programs documents**

Since the ratification of the United Nations Convention on Climate Change (UNFCCC), most African French-speaking countries have tied to the international evolution of the global climate situation, as can be seen from several documents relating to climate change. They used environmental assessment methods and tools, including a participatory approach in the writing and dissemination of:

* Vision 2020, 2025 or 2035: these visions are important national planning and development documents by country. The same approach is applied to economic growth strategies and plans, not to mention national action plans to fight against desertification (PAN-LCD/NAP-FAD)
* Second national climate change communications (SNCC), National Adaptation Program of Action (NAPAs), National Adaptation Plan for Climate Change (NAPCC), Nationally Appropriate Mitigation Actions (NAMAs), Reducing emissions due to deforestation and degradation (REDD) + Monitoring – Reporting – Verification (MRV) and Intended Nationally Determined Contributions (INDC). These reports take into account GHG emissions sectors and factors as well as climatic risk and vulnerabilities.

Also, these strategic documents, drawn up on the basis of broad vertical and horizontal consultation (bottom-up and top-down), integrate national policies, strategies and plans covering key vulnerable sectors (such as agriculture, water, coastal areas or health) and on cross-cutting issues such as climate change, including sector-wide approaches and mitigation measures. Teams traveled towards regions of each country in order to collect from the populations the information needed to prepare these documents. The validation is done after presenting the results to the public, donors, NGO, Governments and stakeholders.

**Climate Proofing for Development of the GIZ (German Technical Cooperation)**

The methodology on which Climate Proofing for Development (CPDev) is based was originally developed in the context of climate risk assessments developed by German development cooperation (GIZ). Climate Proofing for Development” is a tool designed to support the integration of climate change impacts and to reduce its risks (Hahn & Fröde, 2011).Climate Proofing for Development (CPDev) is a methodological approach that aims at incorporating climate change issues into development planning. It enables development measures to be analyzed with regard to the current and future challenges and opportunities presented by climate change.

CPDev can be used at different levels, namely at national (cross sectoral policies, development plans, budget), sectoral (policies, strategies, investments programs), local (municipal plans, land-use planning) and project level (projects and programs). Each level features specific characteristics, e.g. leads to different kinds of actions or involves different stakeholders. CPDev offers a means of identifying and prioritizing options for action when adapting planning to climate change and when reviewing priorities. Finally, CPDev appears to be a multiusers tool: public authorities, national and international organizations, donors, NGOs, associations and private sector. The Climate Proofing for Development approach contains four main steps that can be adapted or enlarged (preparation, analysis, options for actions and integration). Two adaptation cases (agriculture and energy) are going to be developed in the following paragraphs.

The adaptation of African agriculture becomes a priority because agriculture in Africa is a poor relation of climate finance, whereas this continent is the less responsible for climate change while being the most vulnerable (Dupoux & Zrikem, 2016). In Morocco, Mali, Togo and Burkina Faso, the realization of climate proofing in agriculture has led to an EA approach with the four main steps. A Climate Proofing manual / guide for Sustainable Land Management projects and programs in Mali has been developed (including in other countries like Morocco, Togo)

Practically, in the humid and subhumid agricultural sector of Africa (Togo, Cameroon), climate changes are causing the recrudescence of insect pests such as mirids and the emergence of plant diseases like the necrotic decay of the coffee tree, the swollen shoot and the brown rot for the cocoa (Amougou et al, 2013). In the dry regions of SSA (Mali, Senegal, Burkina Faso, Northern Cameroon), cereals (maize, millet and sorghum specifically), which form the basis of food, are particularly vulnerable due to their high sensitivity to water stress, especially at the bloom stage. Thus, the impact of water deficit on these crops can lead to a decline in productivity resulting in a reduction in food supply, accompanied by a surge in prices and leading to the specter of famine. From another angle, excessive rainfall will lead to the proliferation of parasitic microorganisms of plants and insect pests in flooded areas where specific fungi and bacteria will develop and attack the root system of plants, leading to the wilting of these crops.

The second application domain of CPDev is energy. According to Maurice Strong[[1]](#footnote-1) “We must treat climate as a security issue, the most important threat to global security we will ever face. Energy is at the heart of this transition. Climate security and energy security are two sides of the same coin: one cannot be achieved without the other.”

More than half of the world’s greenhouse gas emissions are produced by the combustion of fossil fuels, with the global energy sector being a major producer of emissions. However, the energy sector is not only contributing to climate change, it is also vulnerable to climate impacts. Given the inextricable link between socio-economic development and access to energy, it is clear that any approach to securing development in the context of a changing climate must consider the adaptation needs of the energy sector. Weak energy systems constrain efforts to meet the Millennium Development Goals (MDGs). For instance, energy is essential in reducing disease levels and decreasing child and maternal mortality. It is a key component of functioning health systems, e.g., lighting operating theatres, refrigeration of vaccines, and other medicines, sterilization of equipment and transport to health clinics. Clean, household energy improves household health by reducing or eliminating smoke from cooking fires. According to WHO (2007), Africa loses nearly half a million lives (mainly women and children) as a result of respiratory diseases attributable to traditional burning of wood.

Therefore, it is necessary to systematically identify impacts and reduce vulnerabilities to the identified risks. Changes in temperature affects biomass growth and distribution which impacts quantity and quality of animal fodder and crops, material for human shelter, heating, fuel agriculture, electricity generation, health and sanitation. So, changes in rainfall patterns affects: agriculture, electricity generation, health and sanitation. Given the clean and efficient energy’s role in economic development, it is crucial that energy system vulnerability is to be reduced and the variety of ways for increasing system resilience are identified and implemented. In order to better understand how to trigger and sustain positive synergies, HELIO developed a straightforward methodology and a set of indicators to assess the vulnerability and resilience of national-level energy systems to climate change. By applying the indicators to energy systems, HELIO aims to help identify policies and measures that can best facilitate and support adaptation activities. Helio International (2009), after analyzing the energy problems within 10 SSA countries (Benin, Burkina Faso, Cameroon, D.R. Congo, Kenya, Mali, Nigeria, Senegal, Tanzania, Uganda) in four domains (Hydropower, biomass, Wind and solar energy), conclude that most countries in SSA are directly impacted by changes in rainfall and temperature level. Rain-fed agriculture and husbandry are the norm; biomass is the primary energy source as well as the main fodder for animals. Significant changes in rainfall and temperature patterns have wide-reaching implications and it is important to understand how these patterns are evolving in order to reduce the vulnerability.

According to Helio (2009), adaptation measures can be categorized into infrastructural/technical and behavioural/social responses.

* Technical adaptation tries to make infrastructures less vulnerable against long-term changes in meteorological variables and extreme events.
* Behavioural adaptation adjusts the operation of the infrastructure (both existing and new) and the siting of new infrastructures to minimize damages.

Finally, Helio International (2009) report summarizes anticipated climate-induced impacts on key energy systems and outlines possible adaptation measures. The report concludes with eight recommendations to help reinforcing the resilience of energy systems.

1. Systematically assess and monitor energy systems to ensure that they are robust enough to adapt to anticipated climate-related impacts

2. Expand the current assessment process for new energy systems (solar, biogas, etc.)

3. Develop a medium- to long-term strategy to move toward a safer, decentralized, low-carbon energy supply system

4. Implement energy demand management as an adaptation measure

5. Cultivate in-countries capacity to evaluate and respond to energy needs from a climate perspective

6. Invest in ecosystem services that support existing and planned energy production

7. Establish transparent technology transfer and financing procedures

8. Develop participatory energy governance to cultivate first-hand knowledge of energy needs and to mobilize vital support from beneficiaries

**At the local or regional level**

In Cameroon northern cities, such as Garoua and Maroua, population frequently use firewood for household purposes. Ntsama Atangana et al. (2010) estimated that in those cities, more than 94% of households use firewood, 90% charcoal and 64% wood. Wood consumption is more than 12 times the amount of gas used by households with an average, of 2–3 kg/day individual wood requirement per inhabitant. The anarchical way of collecting firewood creates great pressure on this resource. This situation has brought the Cameroon government to relaunch the Green Sahel Operation in this environmentally sensitive dry region characterized by poor farming practices and overgrazing (Tchindjang et al, 2012).

After an environmental audit, an awareness campaign was launched for local populations to sensitize them and ensure their effective participation (more than 80%) in the implementation and monitoring of afforestation program to stop the desert's advance. This operation aims to prevent and reduce the degradation of arid, semi-arid and dry lands, and then restore degraded soils. It also aims to restore and improve the fertility of degraded and marginal lands, to strengthen the vegetation cover in the Sahel, to discourage the cutting of firewood associated with the distribution of improved cooking stoves to stakeholders, and to raise public awareness against desertification.

As results, one can noticed the return of wildlife and a revival of economic activities related to non-timber forest products (NTFPs). The remaining problems to solve were bush fires, vandalism, deferred grazing, nocturnal pasture and the lack of signage (species) at different sites. Among the diverse approaches in the battle against desertification, four have been chosen and to highlighted.

* Protection, restoration and/or water conservation of the soil by retention of water to reduce the runoff
* The fight against wind erosion by fixing the ground to prevent soil mobilization by wind
* Fighting against bush fires and reducing the burden of firewood by replacing fossil energy by solar sources or improved stoves.
* Afforestation in a participatory manner is a significant and optimal adaptation solution to climate change. It appears to be the most effective response for containing or incorporating the three previous processes analyzed. It is best to advise participating farmers who receive plants for agroforestry and forest management in the agricultural and pastoral areas. In addition, afforestation is the most appropriate response, the most manageable and effective improvement to climate change and climate risks.

Another program led by UNDP (PNUD 2016) through landscape analysis placed local communities at the center of adaptation strategies and with, among other things, afforestation of the school yard by pupils and re-greening of the Sahel.

**Discussion and recommendations**

Overall, in each of the Francophone SSA countries, the strategy documents have integrated adaptation to the various stages of the national policy cycle through policy formulation, planning, allocation and resource mobilization without forgetting the identification and mobilization of stakeholders. Despite the ratification of the UNFCCC Convention, the evaluation parameters of the CC are not yet included in the legislation of the various countries (despite the NAPA, NAPCC, NAMA and INDC), resulting in a lack of legal constraints. However, best practice at the grassroots level helps to correct this process. The Climate Proofing is considered as a good practice, with it integrative, participatory and flexible approach. It provides an opportunity to engage a wide range of different stakeholders in discussions about climate change. It methodology is easy to understand and can be adapted to any context. Moreover, this tool really does not need standardized knowledge and it enables a strong ownership. CPDev improve the participation of vulnerable communities in the processin valuingtraditional knowledge and local know-how in spontaneous adaptation.

However, the intervention and integration of Climate Proofing in agriculture in African countries joins the program launched at the COP 22 on Adaptation of African Agriculture (AAA) to climate change. The African Agriculture Adaptation initiative aims to reduce the vulnerability of Africa and its agriculture to climate change (AAA White paper, 2016).

As energy is concerned, Helio International team uses CPDev in improving energy systems and availability in SSA. Conclusively, Best practices in integrating EA into climate change adaptation lead decisively to the following aspects.

* More resilient ecological agriculture with efficient and integrated agro-pastoral systems that could bring food security
* More resilient agricultural and biophysical landscapes
* Better protection of ecosystems and conservation of biodiversity
* The fight against desertification
* More resilient and smart investments (not only in ecosystems services)
* More resilient economies
* Diversification of energy sources and production with best technologies
* Participatory energy governance which enables populations and beneficiaries to good ownership

**Conclusion**

Climate change is evident and requires appropriate action. The list of biophysical and socio-economic impacts that aggravate existing development problems is long: water shortages, more frequent and more extreme meteorological phenomena (floods, heat waves) that lead to a substantial loss of biodiversity, electricity production shortage, population migration, increasing population conflicts and health risks. The integration of EE tools and climate proofing into planning is a palpable fact in the various countries of French-speaking sub-Saharan Africa. However, even if there is an environmental code in each country, there is a lack of a permanent framework for integrating adaptation into development, including a climate change law and regulations governing the coordination of institutions. However, the establishment of national climate change observatories is also a good practice that supplements this lack of laws. Moreover, CPDev is a simple and participatory tool offering the opportunity to take local knowledge into account, and its integration into the EA process can be an effective substitute.

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1. Maurice Strong is the former Secretary General of the UN Conferences – Stockholm (1972) and Rio (1992). [↑](#footnote-ref-1)