

TOPIC # 2 :Social, environmental and economic impacts and risks associated to hydraulic infrastructures development

Dams provide important services for the economic development of the region. But according to some people, social and environmental negative impacts are too high.

➤ How do you see the impacts of hydraulic infrastructures ? What is your evaluation of the large hydraulic infrastructures ?

The majority of participants mention negative impacts first and foremost:

- The social and environmental costs are borne by external communities and constitute a burden on the most vulnerable. **(Olivier Hamerlynck)**
- The negative impacts on the price of water lead to a disrupted development **(Ousmane THIAM)**
- Adverse environmental impacts that accelerate the sedimentation of rivers **(Moriba NOMOKO-AMCFE)**
- Negative impact on green house effect gas production **(NGOUANA KENGNE Cyrille)**
- Reduction in the quantity of water available for hydroelectric dams downstream

The construction of Taoussa poses more problems than Fomi (3 meters of evaporation which means that the quantity of water is much reduced downstream, especially in the case of the Kainji hydroelectric dam). **(Bruno Barbier)**

- Negative effects on estuaries and coastal zones (notion of sedimentary cell) : Erosion, recession of the salt line (impacts on the mangrove) **(Mathieu Ducrocq)**
- Proliferation of invasive plants because of the relentless freshening of water bodies as a result of the construction of dams: impacts on health, economy, navigation and natural resource conservation **(Amadou Matar DIOUF)**

The alteration of the hydrological regime of water bodies (streams, rivers etc.) and the ecology of the aquatic milieu result into the disruption of ecological niches, disappearance of certain bentic fish species, (mormyridae), fall off in the growth of many fish farm species, etc. before the re-establishment of a new balance. **(Colette KABORE)**

- Negative environmental and social impacts: loss of human settlements, of land and land property, unsatisfactory relocation compensations, disrupted hunting and fishing activities, inequitable energy supply, flooding hazards ... **(METUGE Fahtia, Hope Ogbeide)**

Nearly 90% of communities in Kainji have reduced access to electricity supply. **(Hope Ogbeide)**

- The overflowing of irrigation canals often creates social, economic and environmental disturbances, **(Mrs Warvar.P Isabelle DABIRE)**
- Tremendous negative impact on fisheries

*Dams block up fish migration. The reduction in natural floods causes a decline in productivity and suppression of *frayères*? (fish breeding sites?)* **(Randall Brummett)**

Very few people mention the positive role of the infrastructures in theme 2:

- Positive social and economic impact: job creation, economic growth, energy supply, water storage to cope with drought **(METUGE Fahtia)**
- Diama and Manantali : real potential offered to Malian, Senegalese and Mauritanian populations **(Massamba Diene)**

Additional observations:

The quality of dam projects is gradually improving since the 1980s, in the sense that negative E&S impacts are better analysed, taken into consideration, mitigated and compensated for through the work of the World Commission on Dams, the World Bank and SFI. This requires an extension of the time length for instruction and increase in investment expenditures in order to save time and money afterwards by avoiding unexpected overspending, local /international rejection and legal problems. For example, the Lom Pangar dam in Cameroon, and the Gouina dam in Mali, are likely to meet all these criteria of quality (populations involved, more comprehensive ESAs, better analysed impact zone, alternatives envisaged, monitoring system...). **(Nicolas FORNAGE)**

- Mentalities have been evolving at the global level over the past few years: Brazil, China, Turkey **(Jean-Yves Pirot)**

➤ Are all the risks (including the climate risk) taken into account ? Could you share your experience ?

All these contributions point to the following fact: generally speaking, environmental and social hazards have not adequately been taken into account and this has led to major adverse impacts:

Waterborne parasite, bacterial and viral diseases can rapidly cause the loss of a large part of the benefits derived from the dam if they are not taken on board (e.g.: bilharzias risks have not been taken into consideration for Dama) **(Georges GREPIN)**

- Environmental impacts have not been taken into consideration in Northern Nigeria (Tiga and Challawa dams): invasive plants reduce the rate of flow **(Bart Goes)**

- Unlike international donors, funding from purely private sources do not comply with the E&S requirements for projects **(Nicolas FORNAGE)**

Concerning climate change, the same general opinion that climate change- related hazards are inadequately taken into consideration because of the difficulty in assessing them.

- Climate hazards and even climate change are not often taken on board, which leads to disasters **(Expédit E. AGO)**

- The climate hazard constitutes one of the weak points in currently implemented «best practices ». There is a long way to go before tools are developed for climate change adaptation of dams. **(Nicolas FORNAGE)**

- The uncertainty related to climate change in defining the size of infrastructures is difficult to take into consideration. The Population and land use patterns should also play a key role if we are to look into the future.

For example, it has been shown in some zones, that while rainfall has declined, discharges had increased because of the change in land use patterns (this is the Sahelian "paradox"). **(Philippe Roudier)**

Only one case was proposed to illustrate the consideration of environmental hazards and full revision of a project:

- Environmental hazards have been taken into consideration in the River Gambia case.

The recommendations from the impact assessment of the dam project on the Gambia have made the project owners completely revise the location and design of the facilities, especially because of the risks identified to the mangrove, stability of the coastal line of the estuary, the anticipated silting of some parts of the river, etc. **(Mathieu Ducrocq)**

➤ At which level can we accept the humid zones reduction (example: Inner Niger Delta) due to dams?

This question has created a little controversy. On the one hand, the pro-dams people who see in these infrastructures, energy and food security through full water resource harnessing and on the other hand, the champions of wetlands that rather advocate for alternatives that can prevent too heavy negative impacts on the environment and populations.

Certain participants relate wetlands to the sole migratory birds. Isn't this a bit restrictive, given the knowledge about these ecosystems and their role in the environmental and social balance?

However, the shrinking of wetlands is unanimously rejected (at different levels):

The decline in floods in the inner delta of Niger (because of Fomi) will lead to the reduction of productivity in the delta with heavy environmental, social and economic consequences (but poorly perceived and controlled) and millions of losers. **(Olivier Hamerlynck)**

Specific mitigation measures should be envisaged, namely artificial floods **(Olivier Hamerlynck and Nicolas FORNAGE)**

- To conserve the delta for livestock rearing and small irrigated plots **(Bruno Barbier)**
- The total annual discharge should not be reduced downstream the dam **(Bart Goes)**
- The reduction in wetlands will make migrations more difficult both up and downstream as well as lateral migration of fish.

*This is what happened in the North –West province on the Bamenjim dam. **(METUGE Fahtia)***

- The reduction in wetlands will increase erosion **(METUGE Fahtia)**

Moreover, it is important to analyse every single situation on a case-by-case basis in order to define the best solution possible (best trade-off) and avoid radical decisions that often prove to be harmful in the longer term:

- Every case is unique and requires specific analysis regarding wetlands.

*It has thus been determined that for certain cases, keeping the integrity of the wetland with its natural functions, the goods and services that it delivers including the needs of riparian communities is far better than turning it into a dam (Diawling or Djoudj) ; conversely, for other cases, the conversion is a requirement and building a dam is quite relevant (case of Diama dam). **(Soulama Drissa)***

- The economic analysis of dam projects that impact on these wetlands should include the enhancement of all monetary (recession crops, fisheries, « **bourgoutières** », water for cattle, etc.) and non monetary services (biodiversity conservation, ground water replenishment, etc.) in the comparative analysis of “with a project /without a project”. **(Nicolas FORNAGE)**

➤ What changes need to be made in dam planning to incorporate fisheries management and aquaculture? To take into account the modifications of the sedimentary dynamic which can totally modify the seashore?

Very few inputs to this more technical question but explanations and clear proposals to be taken on board.

- People increasingly discuss coastal risk management, and watershed in such locations is one of the critical aspects to be taken into account.

Taking into consideration the effects of the modification of hydrological and sedimentary regimes on estuaries and coastal zones and envisaging flow rate management systems that help maintain low water periods, floods and capacity to expel mud so as to avoid gradual clogging. In the case of significant reduction in inflows because a dam has been built, it would be helpful to anticipate the piling up of sedimentary reserves that would make it possible to seek the matching units on a regular basis and limit the acceleration of the coastal erosion phenomenon. (Mathieu Ducrocq)

- During the impact assessments and design of the works

- ° Fisheries and fish farming actors should be included in the identification of stakeholders;
- ° Involve a fish resource specialist in the working team;
- ° Take account of the place of every socio-professional group;

- During the construction of the works

- ° Take account of the impact of noise of machines on water species;
- ° Have a suitable management system of hydrocarbons that can pollute the aquatic environment;
- ° Reduce to the extent possible, floating matters that can affect the clearness of water and hence its conductivity and capacity to produce phytoplankton (this could be achieved through sound management of heavy vehicle movements);
- ° Provide for the safe establishment and use of fish farming units depending on the various exploitation systems.

- After the construction of the works

- ° Implement the environmental management plan (Colette KABORE)

- There is need to adapt the infrastructures so as to enable fishing even though this is expensive because reservoir –based fishing is more productive compared to river fishing (fish farming, restoration of river banks, quality management of water, de-sedimentation, ex site conservation of certain species ...). (Randall Brummett)

Ponds can be established for fishing. (METUGE Fahtia)

➤ Which recommendations to dams promoters would you like to make ?

Many recommendations were made, which reflect serious current problems around large infrastructures and the need to revisit their design, management and exploitation procedures:

- Sound knowledge on watersheds is required.

-The knowledge on watersheds should be improved by reasoning in terms of a network of stations for the various measures required for mapping out the risks. (Expédit E. AGO)



- step up efforts towards surveillance, monitoring and updating of data on dam sites and downstream (hydrology, water uses, ecology, morphology of the river and social impacts) **(Bart Goes, NGOUANA KENGNE Cyrille et Nicolas FORNAGE)**

- The vulnerability of people and heritage should be reduced.

- Through structural, constructive or technical measures at basin level **(Expédit E. AGO)**

- reduce climate hazards by mapping out the risks, delineating for instance flood zones and areas that are unfit for construction and for which the government or district authorities should not deliver building permits or allow human settlements. **(Expédit E. AGO)**

-Simple measures are sometimes adequate, such as the training of local representatives and refuse collection staff to avoid for example, as seen in a country around the Mediterranean, the installation of a waste dumping site in the dam lake upstream the catchment area. **(Georges GREPIN)**

- Provide for an effective monitoring – evaluation system as well as a suitable grievance procedure for the local populations; **(Nicolas FORNAGE)**

- Pay great attention to the restoration of the incomes of persons displaced because of the project, an always highly sensitive issue; **(Nicolas FORNAGE and METUGE Fahtia)**

- Do not forget the issue of cultural heritage (archaeological remains, cemeteries, sacred woodlands, etc.); **(Nicolas FORNAGE)**

-There is need to convey information to the populations **(METUGE Fahtia)**

- Promote and apply the IWRM approach **(Expédit E. AGO and Nicolas FORNAGE)**

- Abide by the principle of consulting the local populations at all stages of the projects ; **(Nicolas FORNAGE, METUGE Fahtia)**

-Need for a concerted approach to water and energy management. **(Peter Torreken, Bart Goes)**

-Through quality research (impacts on aquifers, deltas, wetlands; maximising environmental discharges and their benefits in terms of ecosystemic functions and services; effective restoration and compensation techniques. Cost-benefit analyses, etc.) and organised debate, it is important to continue discussing the impacts on the functions and services, but also and mostly on environmental and social restorations and compensations in place in the longer term **(Jean-Yves Piro)**

- in a context of sound and sustainable value enhancement process, it is advisable to build investments upon in-depth knowledge of basin natural resources that are invaluable and the reconstitution of which would require huge funds and lengthy timeframes that are harmful to the conservation and sustainable use of resources. **(Abdoulaye Touré)**

-Governments should play their role by imposing to malevolent operators to comply with the environmental and social law and regulations. **(Nicolas Fornage)**

- Better take account of Environmental & Social Impact Assessments (ESIA)

-Promote a holistic approach during the construction of dams: most often and still today, studies are sector-based and the environmental impact assessment is but a component, indeed a major one, but not a key component of the study, whereas it should be the core element. **(Georges GREPIN)**

-launch E & S impact assessment studies as soon as feasibility studies are conducted in a way to mainstream into Preliminary Design and Detailed Design the modifications from the studies of alternatives and E&S optimisation of infrastructures ; **(Nicolas FORNAGE)**

- Make sure to integrate into the project the best treatment possible of its negative externalities; **(Nicolas FORNAGE)**

- Consider the cost of measures to mitigate negative impacts as an integral part of investment costs of the project (and not as a separate or accessory component) –Include the project in an integrated

watershed management approach – in particular when it involves international waters; **(Nicolas FORNAGE, Randall Brummett)**

- Rapidly recruit a team dedicated to E&S aspects in a way to initiate as soon as possible field surveys, census of impacted persons and consultations (in any case, before the start up of works) ; **(Nicolas FORNAGE)**

- Try to apply in a careful but pragmatic manner, the World Bank E&S requirements that constitute today, whether we like it or not, an international standard. **(Nicolas FORNAGE)**

-The development of hydraulic infrastructures should not be politicised. Instead, the assessment of social and environmental impacts should be fully conducted before their construction. **(chizoba ud)**

- Use past experiences

-Build upon past experiences to better predict the risks incurred by new dams **(Bart Goes)**

-An expert software tool fed from experiences gathered from all countries would be useful in conducting a prospective study of potential short and long term problems depending on the various scenarios. **(Georges GREPIN)**

- Evaluate/consider alternatives

-You should not systematically chose to have large dams. You should rather explore the possibility to have small or medium sized hydroelectric dams which are often more beneficial in terms of E&S impacts; **(Nicolas FORNAGE)**

-Give preference to small rather than large scale irrigation (e.g. : Niger Office)

*In Nigeria, large scale irrigation is a national disaster while small scale irrigation (of the Fadamas project type) has had a considerable impact (small piped wells and little motor pumps for farmers who were producing recession crops) on millions of peasants. **(Bruno Barbier)***

*The overflowing of irrigation canals sometimes creates social, economic and environmental disturbances. **(Mrs Warvar.P Isabelle DABIRE)***

- Have decision-making tools on a case-by-case basis: develop scenarios, modelling, Research, forecasts, projections, etc. **(Dicko, Alhousseini)**

- Improve the infrastructures and their surroundings for fishing, hunting, farming (tanks for surplus water, fishing ponds, irrigation ponds, demarcation of community forest reserves ...)**(METUGE Fahtia)**