

#8- 2023 **POLICY BRIEFS**
'Valley Bottoms' Structuring Action

The valorisation and development of valley bottoms in West Africa: a new approach to design more sustainable projects

Valley bottoms are humid facets of land in Sudano-Sahelian Africa. They have a complex water regime with alternating floods and droughts. They have a variety of uses, playing multiple roles in food security, and are coveted for their productive potential (concentration of water resources and fertile soils) despite their ecological fragility (erosion, biodiversity issues, pollution). In addition, global changes - climatic and demographic - are having a major impact on these areas, with high economic, social and environmental stakes. Since the great droughts of the 70s and 80s, these areas have been the focus of development programmes, mainly for rice growing and sometimes for market gardening. The aim is to create water conditions that are more favourable to the expansion and intensification of crops. The results of these programmes in terms of sowing, yields, durability of the structures and facilities, the environment and social ownership (land disputes) are often inadequate, which means that overall sustainability is poor. The design studies appear to be partly the cause of these shortcomings.

KEY MESSAGES

1/ Place valley bottom development projects in a long-term perspective aiming for the social, economic and ecological sustainability of the development; this approach is not explicit in current study and design programmes for valley bottom development, where only environmental and social protection measures are planned (compensation and not impact avoidance or reduction).

2/ Promote the active participation of beneficiaries in the co-construction of a development 'solution'. This means a transition from consultations that are scarcely taken into account to a project that is defined jointly, in all its dimensions.

3/ Integrate an interdisciplinary approach for a more comprehensive pre-development diagnosis; this involves taking into account the multiple issues at stake on the sites (multi-functionality, biodiversity, water regulations, social organisation) but also documenting the land redistribution and agricultural development projects at an early stage, which until now have been considered after the dykes have been implemented.

4/ Implement five complementary methods proposed to operationalise the principles of sustainability and participation: (i) adopt a spatial and interdisciplinary approach to the context, (ii) introduce an environmental diagnosis as early as the detailed preliminary design phase, (iii) focus the hydrological analysis on agronomic and water management purposes, (iv) carry out a more in-depth social and land tenure diagnosis to



ensure fair access to the valley bottom, (v) add an agronomic study with a view to sustainable development to the detailed preliminary design.

5/ Provide adequate material and human resources to conduct detailed preliminary design studies integrating complementary methods dedicated to each site.

ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

The growing interest for the agricultural development of valley bottoms in West Africa, in particular through the Sahel Irrigation Initiative (2IS), has motivated this COSTEA structuring action (SA) carried out in collaboration with the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS). The objective of this SA is to analyse and improve methods for designing and supporting valley development projects in terms of: (i) better knowledge of the physical and social environment and of economic and technical opportunities, (ii) the participation of beneficiary users in the preliminary diagnosis and choice of design options, particularly by taking into account the implications of these options on water, crops, the environment and access to resources.

By mobilising national and international experts, the COSTEA 'Valley Bottom' action implemented case studies in Mali, Burkina Faso and Niger, in the context of a development process led by the Sahel Irrigation Initiative Support Project (PARIIS). Two valley bottom sites were used as illustrations in each country to test interdisciplinary and participatory diagnostic methods and tools, with a view to identifying the main issues at stake in a development project and proposing improvements in project design and monitoring procedures.

The study principle adopted was to cover three main themes, each giving rise to field expertise, in 'hydrology and hydraulics', 'agronomy and the environment' and 'socio-economics and land tenure' respectively, and then to integrate these expert assessments into a joint diagnosis and participatory approach at each study site. These studies were coordinated by a tandem made up of a 'national key expert and an international expert' from the consortium. This involved coordination and collaboration between the thematic experts in the interface areas of: the agricultural and social management of water, the strategies and practices of local stakeholders, and land development and allocation.

PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

The study was conducted by the CIRAD-INSUCO-IRD consortium¹ in partnership with the IER in Mali, the INERA and the HCS office in Burkina Faso, and the University of Niamey in Niger. The experts brought together by the consortium exchanged regularly with the PARIIS teams in order to gather documentation on the case study sites, learn about current development projects and report on the progress of the diagnostic work. The following sites proposed by PARIIS were selected, mainly in Sudanese climatic zones:

- Mali: micro-dam projects for rice and market gardening:
 - Doumba-Sokorola (commune of Doumba, Koulikoro cercle), a densely populated area, with sesame and market gardening as cash crops;
 - Senou (commune of Kemekafo, Dioila cercle) in a cotton-growing zone;
- Burkina Faso: contour bund projects for valley bottom rice cultivation:
 - Tialla (commune of Fara, province of Boucle du Mohoun), sesame and gold mining zone, with the rehabilitation of older schemes;
 - Nambé (commune of Koubri, Centre province); peri-urban site with strong market gardening activity.
- Niger: (the only sites in the Sahelian zone), weirs to recharge the water table for market gardening:
 - Founkoye (commune of Tahoua) peri-urban, water-rich valley segment with weirs to be rehabilitated;
 - Valley of Tadiss (commune of Tahoua), diffuse developments with wells.

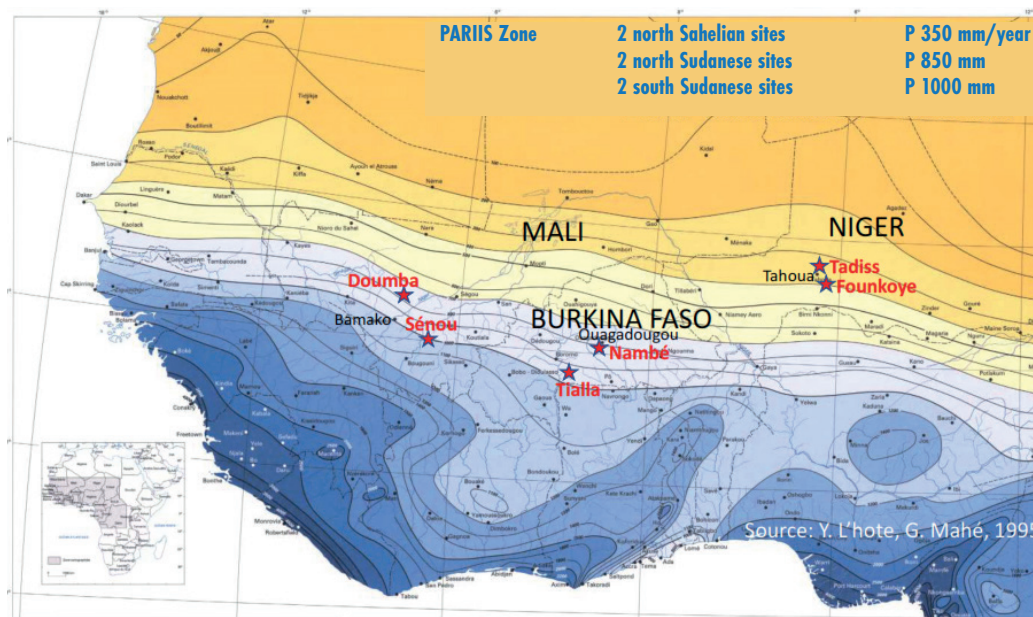
The expert assignments were carried out according to a common six-phase approach:

1. Meeting to introduce the teams to each other. Review of the detailed preliminary design and environmental and social impact assessment documents for each project underway;
2. Pre-characterisation of the study sites based on the available documentation and information gathered from the operators of the development projects on the sites (project ownership, PARIIS management units and consultancy firms). The study methodology, and in particular the content of the field surveys, was refined based on this prior knowledge of the sites and the detailed preliminary design studies;
3. A pre-diagnosis of the sites, which consisted of providing an initial overview of the resources, uses, social structures and constraints to be overcome with a view to development. This part of the assignment was preceded by a feedback meeting on the pre-characterisation with the national PARIIS team and discussions on the participation of PARIIS in the pre-diagnosis mission;
4. In-depth diagnosis of the sites with an evaluation of the physical and social sustainability of the current way in which the resources are used, the risks and potential, as well as the projected development options;
5. Feedback mission and participatory evaluation of the results of the diagnosis with local actors;
6. Feedback of the results and consultation with the project owners and the technical and financial partners of the development projects underway during a regional workshop on the methodological lessons learned.

The case studies carried out in each of the countries enabled lessons to be drawn on which the recommendations of this COSTEA structuring action are based. These lessons are outlined below, and are based on the contributions and limits of the current procedures for designing developments (detailed preliminary design) identified during the study.

1. CIRAD: Centre de Coopération internationale en recherche agronomique pour le développement (French Agricultural Research Centre for International Development); IRD: Institut de Recherche pour le Développement (French public research institution); IER: Institut d'Economie Rurale (Rural Economics Institute of Mali); INERA: Institut de l'Environnement et de Recherches Agricoles (Environment and Agricultural Research Institute of Burkina Faso); HCS: Hydro Climate Services.

Map of the case studies



Pre-defined development models based on rural engineering expertise

Project design and feasibility studies are carried out by rural engineering experts who define a site development plan using four basic studies: (i) topographical; (ii) pedological; (iii) hydrological-hydraulic; and (iv) socio-economic. These plans involve a single model for valley bottom structures, defined from the outset at the level of the country on the basis of experience gained. These include the reinforced contour bunds of the Action Plan for the Rice Value Chain (Plan d'Action pour la Filière Riz, PAFR) in Burkina Faso, micro-dams in Mali and weirs in Niger. This standardisation reduces design costs and facilitates monitoring. It makes the most of national expertise, but hinders the identification of alternatives that could prove to be interesting and adapted to new site configurations (depending on the size of the catchment area, the pre-existing development dynamics, the objectives and constraints of the farmers, etc.).

The various technical and socio-economic studies are compartmentalised, and agronomy is either absent from or split between the different studies. The purposes of the structure or facility, and therefore the implications of the development options chosen for its exploitation, are not explored in depth. In particular, the hydrological studies in the detailed preliminary designs consulted deal only with the estimation of hydrological risks ('design floods') and do not assess the hydric risks (drought, flooding) to which crops are exposed, and the capacity of developed structures or facilities to mitigate them. Detailed preliminary designs are based on the assumption that there is a need to increase water resources, whereas excess water is another risk in valley bottoms. This inductive reasoning places the irrigation solution before the explanation of the problem to be solved: drought or excess water.

General objectives focused on 'production development' but whose sustainability is not yet clearly set out

The detailed preliminary design reports generally begin by recalling the objectives of the PARIIS project as defined by the CILSS Task Force: assess **technical feasibility** (conditions to be met) and **viability** (socio-economic dimension), so that the development can **increase the irrigated area** (quantitative objective), **diversification** and ensure **optimum** conditions for the exploitation of the valley bottom (**efficiency, production**). Environmental and social considerations are limited to compensatory, social and ecological safeguards in the event of impacts, i.e. the environmental and social impact assessment (ESIA), which comes at the very end of the objectives. The second objective of diversification would mean promoting more than rice alone. While this is indeed the case in Mali and Niger, in both cases in Burkina Faso, the aim is to move from the diversified crops before development to an exclusively rice-growing programme, including in a peri-urban market-growing situation such as in Nambé.

The sustainability (economic, social, ecological) of this agricultural development is therefore not identified as a central objective. Ecological and social concerns are only to be found in the Environmental and Social Impact Statements, as though they were a condition coming 'after' the detailed preliminary design, in the shape of a formal procedure aimed at offsetting 'impacts.' However, given that social and environmental issues have become so prevalent everywhere, as have hydrological risks, particularly in the rare wetlands of these dry regions, it would be a form of modernisation to consider these goals from the outset, on an equal footing with the objective of economic production, so that these developments can play a pilot role in terms of awareness and innovation.

A normative approach to agricultural development and an implicit, standardised agronomic diagnosis

In the basic studies preceding the identification of a development design, only scattered elements were found concerning current agro-sylvo-pastoral practices, the state of the environment or the type of enhancement that would add value to the development and protect the environment. Only the pedological study, based on the suitability of the land, proposes technical standards for development on the basis of the current technical research sheets. The reports from the various sites thus have a common basis. The projects are largely designed in advance on a standardised basis, despite the advantages of taking better account of local knowledge and context in order to improve the project. Even when developed, valley bottoms remain restrictive, at-risk environments, and the market price of local rice aligned with the low costs of imported industrial rice, is insufficient. All of these constraints mean that rice is still a secondary crop in the allocation of resources and working time, despite its potential. This justifies a more nuanced analysis, taking into account the different types of actors, their capacities and priorities.

This dispersed, all-purpose, normative agronomic approach which is not very comprehensive and not concerted, is partly due to the traditional preference of multi-site agricultural projects for a low-cost, prescriptive approach (top-down, technical sheets), as well as to a certain disciplinary culture of the consultancy firms hired for the detailed preliminary design (hydrology, rural engineering, pedology, socio-economics) that are not very familiar with agronomic and environmental issues. A comprehensive and concerted approach (surveys, focus groups, workshops), rebalanced (agronomic themes taking into account environmental objectives) and dedicated to each site, will require special arrangements (visiting the site at multiple seasons, involving an additional expert).

Consideration of environmental issues reduced to feasibility considerations, without integration into the project

The environmental and social impact assessment is currently driven by a legal rather than a technical rationale, with a view to the validation of the project's feasibility by the supervisory authorities, and identifying measures to compensate for impacts, to be implemented via the Environmental and Social Management Plan (ESMP) accompanying the development. This study depends on another source of funding and specific consultancy firms. It is therefore not closely linked to the detailed preliminary design in terms of timetable and teams.

However, if the 'description of the environment' part of the Economic and Social Impact Statement was carried out at the same time as the other baseline studies, and included in the detailed preliminary design, the development project designed would undoubtedly be very different. It would be confronted from the outset with the fragility and unsustainability of a rice-growing development: the initial destruction of the entire wetland ecosystem, the transformation of a complex environment into a homogeneous area with several dozen hectares that lie barren

in the dry season, crossed by floods of increasing intensity, the lack of consideration given to the risks of erosion and the limited capacity of producers' organisations to maintain large structures. Similarly, the project would be able to take into account the many previous activities (multifunctionality of wetlands) and the relics of natural environments to be preserved, and could establish ways of greening rice and market gardening practices that are compatible with the local and regional natural and human contexts.

Limited participation of local people

The principle of involving the beneficiaries in the process of developing valley bottoms is now recognised as a key to ownership and sustainability. The participatory approaches currently in place mainly involve public information meetings, consultation on the beneficiaries' contribution to the construction of the structures (labour to collect materials), and the setting up of a management committee and complaints committee. But this approach is more akin to awareness-raising or consultation than to effective, active participation by the users.

Another limitation to participation that was identified is linked to the posture of experts with technical knowledge and the capacity to prescribe, which the Project Management Units (PMUs) and consultancy firms maintain with regard to the beneficiaries. This stance does not always allow local knowledge to be collected and capitalised on (i.e. farming practices that have succeeded in coping with the constraints of valley bottoms and taking advantage of their resources, and vernacular classifications - soil, terrestrial and aquatic fauna, vegetation, crop varieties). This can create a discrepancy between the 'expert' vision of what valley bottom development should be and the beneficiaries' vision of what development should do for them to remove the constraints that have hitherto limited agricultural development.

Little account taken of the complexity of land tenure

The organisation of plots of land, the customary rights governing access to land and the holders of rights over the valley bottom are poorly documented in the pre-development diagnosis, beyond the identification of the major landowning lineages and lists of rights holders that are not always exhaustive. The projects often envisage a reorganisation of the valley bottom land plots in order to ensure full development and to open up access to the land to a larger number of users (in particular to include those who have contributed to the work). However, the precise arrangements of these reallocations are left to the community to define once the development has been completed. Discussions about land ownership are perceived by project sponsors and developers as a potential source of conflict which would be detrimental to the completion of the project.

In principle, making land available for development is a condition of the site's eligibility. However, the issue of formalising the provision of land is rarely addressed by the projects and creates a degree of ambiguity. It is generally a 'land transfer statement'

which, for PARIIS, is supposed to represent a 'purge of rights' and their transfer to the project, and therefore to the State. In some cases, private projects can use this land transfer document to introduce forms of exploitation that are far removed from the interests of local communities. However, these documents may appear to be at odds with the national legal land tenure frameworks.

KEY ISSUES ANALYSED IN OUR SITE STUDIES

The site diagnoses provided a deeper understanding of the key issues raised by valley bottom development and enabled methods to be tested to better integrate all of these issues into project design. The following five key issues emerged:

- mobilising and sharing water to secure crops and other uses (agriculture, livestock, fishing, foraging, wood) in the face of climatic risks, to extend crops and valorise the dry season;
- the functionality and sustainability of the development, ensuring that it is in line with the technical constraints of the site and is adopted by organised users;
- preserving a satisfactory environmental state: controlling the major risk of erosion, conserving biodiversity, rationalising multiple uses to make the most of the diversity of the environments, preventing pesticide pollution, etc;
- the social cohesion of the community and inclusion through appropriate management of the land in the developed area;
- adapting farming practices: limited-risk intensification, diversification, more environmentally-friendly practices, etc.

RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses carried out by this structuring action concerning valley bottom development have enabled COSTEA to formulate a number of messages and recommendations. These aim to promote the economic and social development of these areas and remove the obstacles to sustainable development.

1/ Place valley bottom development projects in a long-term perspective aiming for the social, economic and ecological sustainability of the development. Until now, sustainability has not been explicitly given as an objective for development projects, which remain focused on increasing agricultural production in the name of national food sovereignty or local food security. Only compensation measures (social and environmental safeguards) are proposed, with the idea that the adverse social and environmental impacts of any project are a matter of financial compensation or reforestation elsewhere. And yet technical failures, environmental degradation and past conflicts linked to previous developments have made local actors themselves aware of the risks and of sustainability. Some damage

cannot be compensated for because it cannot be assessed, such as the destruction of rare wetland species, soil erosion, the loss of power of former land managers as a result of the devolution of land to a project, foraging activities, etc. Previous developments have been accompanied by severe degradation of the environment through erosion and deforestation and by forms of social injustice, and local people feel that they have not been listened to enough, and would like new projects to start by managing these problems. Thinking about sustainability from an early stage (site identification, detailed preliminary design) rather than afterwards, will make it possible to equalise the three objectives of human, economic and environmental progress, without reducing the valley bottom to its purely productive dimension. Firstly, it is necessary to get back to the basics of development, which is not merely economic expansion but also human gain (building capacity, empowerment, independence and equity), in a spirit of adaptation to the environment (and so without a standardised vision). To implement the objective of sustainability, it is up to the project (and its funding agency) to accept to reconcile the project's economic ambitions (even if it means reducing them) with its social and environmental ambitions, and to reason in terms of 'areas of the environment sustainably managed without conflict' and not merely 'area of rice that can be sown in the scope of the development.' The environment involves long-term commitment, and therefore also has a value, which has several components: 'intrinsic' (the right of species to exist in their environment), 'use' (the material and immaterial value accorded to it by its many users) and 'non-use' (the potential future uses arising from its preservation and the ecosystem services resulting from good conservation). The social dimension involves listening to and effectively taking account of society, its expectations and the demands of its most vulnerable or dominated members (such as women and young people), while respecting local social structures.

2/ Promote the active participation of beneficiaries in the co-construction of a development 'solution.' The principle of participation is now recognised as an essential condition for the success of development projects, by going beyond a passive type of participation through information and awareness-raising. PARIIS has already taken a number of steps in this direction, including: identifying potential sites for intervention through surveys involving local actors to discuss viability criteria; analysing beneficiaries' objectives and expectations in the socio-economic baseline study of the detailed preliminary design; asking beneficiaries to contribute their labour to build the structures; and setting up a 'complaints committee' to readjust the approach when the development is being carried out. However, the objective of participation appears to be hampered by several factors that need to be corrected. Firstly, it is in contradiction with another project objective, which is to speed up execution by standardising the models of structures that are disseminated on a large scale. The pre-determination of the structure dedicated to valley bottoms on a country-wide scale limits the possibilities of adapting to farmers' preferences and

sometimes leads to increased development complexity to deal with sites with poor suitability for the model. Furthermore, participation also comes up against the habits and time constraints of the experts in charge of the diagnoses. Unfortunately, little use is made of local knowledge on the environment and the perceived restrictions for development. Gathering this knowledge requires additional survey resources, not limited to sociologists alone, but extended to technical experts in hydrology, soil science and agronomy or agro-ecology, where available. Finally, the participation of beneficiaries in project implementation is generally limited to material handling tasks, and local artisans are rarely involved, even though they could acquire maintenance skills. Moving towards the beneficiaries' active participation would therefore involve opening up the development options for each site, capitalising on the range of models of structures identified by PARIIS, taking greater account of the knowledge of the various valley bottom users (both women and men) about the constraints and opportunities for developing their environment, and integrating local artisan masons in skilled labour tasks.

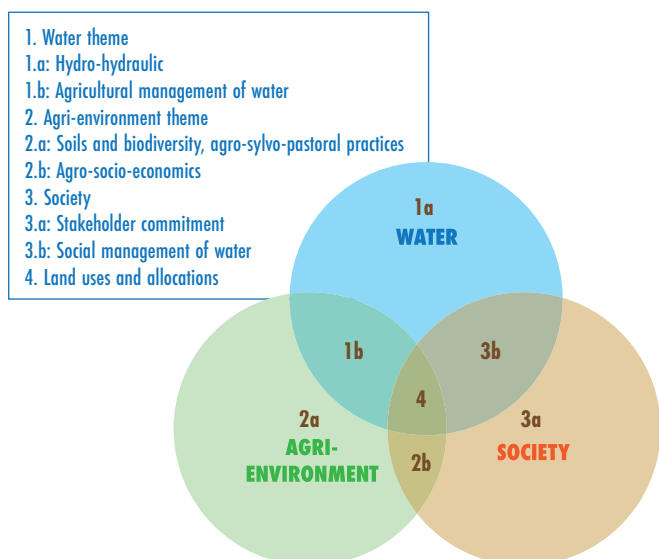
3/ Integrate an interdisciplinary approach for a more comprehensive pre-development diagnosis taking into account the multiple issues of the sites. Conventional pre-development diagnoses lack an overall understanding of the current site, the issues at stake (the valley bottom's current multiple functions, the expectations of the different categories of farmers, agronomic and environmental diagnoses) and the likely systemic consequences of various development scenarios. Indeed, everything is interconnected by well-established links and logics: the organisation of local society (land tenure system, economic system, hybrid customary/modern governance), the valley bottom ecosystem and the current system of activities. After development, the transformation will affect each of these elements. There will be winners and losers, and the target population will be confronted with the gap between the new development and their expectations. It would

therefore seem that the added value of a reform of the study processes should focus on three areas: (i) adding new themes to fill in the many gaps (e.g. no agronomy, environmental baseline produced afterwards, hydrology not sufficiently included in the agricultural management of water, the current land tenure system and its post-project reform scarcely addressed, etc.); (ii) strengthening the participation of local stakeholders, making the most of their local knowledge and taking current logics into account; (iii) integrating the three disciplinary viewpoints through interface themes: agricultural management of water, agro-economics, agri-environment, joint collection of knowledge and expectations, and cross-functional workshops with the beneficiaries and their support.

4/ Implement the five complementary methods proposed in the framework of the COSTEA study to operationalise the principles of sustainability and participation:

- The first method consists of providing a **synthetic and integrated (interdisciplinary) overview of the resources and uses of the valley bottom and their implications** for the development, and of the place of the valley bottom within the territory, based in particular on cartographic and territorial approaches.
- The second method involves **integrating the environment right from the pre-development study phase**. In particular, this involves understanding how the ecosystem has evolved to its current state and assessing ecosystem services in terms of their provisioning, regulating, cultural and support functions. It includes studying the prospects for greening productive development. Finally, once the development has been defined, an ESIA will lead to the definition of compensation arrangements for the ecosystem services lost.
- The third method aims to **focus the hydrological analysis on agronomic and facility management purposes**. In particular, this involves assessing the water risks for crops, and analysing the operation of the structures and their capacity to mitigate risks (agro-climatic analysis, rule curve for micro-dam reservoirs, drainage/retention functions of dykes).
- The fourth method aims to gain a better understanding of land tenure issues through a **social and land tenure diagnosis** to anticipate post-development tensions and foster equitable access to valley bottom land.
- The fifth method is to help reason the **adaptation of cultivation models** and uses for improved and diversified development, through an 'agronomy of practices' approach based on what already exists and know-how, and reasoning the adaptations and transformations.

5/ Provide adequate material and human resources to conduct detailed preliminary design studies integrating complementary methods dedicated to each site. The implementation of detailed preliminary design studies as recommended requires additional expertise and longer lead times. It also requires a reorganisation of the project cycle, integrating the environmental study as early as the





detailed preliminary design phase. As far as the environment thematic is concerned, the additional cost is therefore nil if it is ensured that the baseline study, currently included in the impact assessment, is produced in view of the detailed preliminary design, i.e. before the design of the development, which will be followed by an impact assessment.

Limits of the approach

During its implementation, the COSTEA study encountered a number of difficulties in gaining access to the field due to the security situation in the countries concerned. The project team also mentioned that an additional expert in civil engineering would have allowed deeper reflection on the implications of the study's results on the design of structures.

With regard to the limits related to the results, it should be noted that the reorganisation of the detailed preliminary design and ESIA studies may come up against regulatory constraints that set the conditions for the assessment of environmental and social impacts. In addition to the formal validation of the study's recommendations by the final workshop, it would be advisable to test them initially with a view to refining the operating methods to make them compatible with the dedicated resources.

COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Three country reports: Burkina Faso, Mali and Niger, on the issues involved in developing valley bottoms and the conditions for designing projects (www.comite-costea.fr/actions/amenagement-des-bas-fonds)
- Six site reports (www.comite-costea.fr/actions/amenagement-des-bas-fonds)
- A report on pre-development diagnostic methods in West Africa (www.comite-costea.fr/actions/amenagement-des-bas-fonds) (deliverable 2)
- A report on the organisation of project studies and new methods for pre-development diagnoses of valley bottoms (www.comite-costea.fr/actions/amenagement-des-bas-fonds) (deliverable 3)
- A documentary database (www.comite-costea.fr/base-documentaire-eau-et-agriculture/?_thmes=bas-fonds)