

RETRAINING MANUFACTURERS OF FIRED BRICKS AND RESTORATION OF DEGRADED BANKS PROGRAMME



MARCH 2017

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Foreword

This project note has been prepared in connection with CTCN technical assistance provided at the request of the Ministry of the Environment, Water and Forestry of the Republic of Guinea.

Apart from national economic development policies (Poverty Reduction Strategy Paper, Five-Year Development Plan, etc.), the Republic of Guinea Conakry has put together a series of policies to improve people's resilience in the face of the harmful effects of climate change. These include the National Adaptation Plan of Action (NAPA), the Initial National Communication and, more recently, the Intended Nationally Determined Contribution (INDC). This contribution provided an opportunity for Guinea to highlight the fundamental importance of taking account of climate change adaptation in the country's development process. The INDC stresses that adaptation is essential to anticipate the impacts of climate change and thereby reduce the costs and damage they cause. It also pointed out to the international community the huge efforts that Guinea needs to make to cope with the negative effects of climate change, as well as to shoulder its responsibilities in relation to the vulnerability of the West African sub-region.

Implementation of the project ideas and strategies is, however, still very limited due to lack of the expertise needed to put together "bankable" projects that can be financed by climate donors.

This is the background to the request for technical assistance made by the Republic of Guinea, through the National Environment Department, to the CTCN (Climate Technology Centre and Network) to overcome this barrier to access to finance for adaptation projects.

This assistance has helped to support a community of "champions" to come up with consolidated project ideas. The present project to **Retrain manufacturers of fired earth bricks and restore degraded banks** is one of the five projects/programmes with strong climate change adaptation potential selected by the national authorities.

This concept note aims to present the broad lines of the project and enable potential funders to assess the relevance of the project with regard to the expected impacts and their own strategic orientations. The next step will be to determine the procedure for putting together a complete project file, taking account of the specific access requirements of each international donor.

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Summary programme presentation

Project name	PROGRAMME TO RETRAIN MANUFACTURERS OF FIRED BRICKS AND RESTORE BANKS DEGRADED BY THAT ACTIVITY
Project area	Middle Guinea, Labé and Pita prefectures Upper Guinea, Kankan and Siguiri prefectures Lower Guinea, Kindia, Coyah and Dubreka prefectures
Main programme partners	Ministry of the Environment /DNE CERESCOR APG BTC Ministry of Urban and Spatial Planning Ministry of Energy and Hydraulics/DNH Ministry of Agriculture
Summary	<p>In the Republic of Guinea, housebuilding is an activity involving the entire population and its management raises enormous environmental, economic, social and even cultural problems.</p> <p>The use of fired bricks in building is a traditional practice which entails the use of significant quantities of wood and contributes to destroying the banks and even the beds of watercourses, making it one of the factors aggravating the impacts of climate change. For example, the activity of the numerous brick kilns installed along the Milo river and surrounding area threatens its very existence. In other areas, entire watercourses dry up as a result of this practice.</p> <p>Because it does not use wood, the compressed earth brick (CEB) technique can considerably reduce the environmental impacts caused by fired bricks whilst improving brick-makers' income.</p> <p>Learning the lessons from past CEB initiatives in Guinea, the project will follow a value chain approach from training and monitoring of artisans through to measures fostering the emergence of favourable or even reserved markets for CEBs, via collaboration with contractors in the building and public works sector and intermediaries, not forgetting awareness-raising and promotion amongst users. The programme plans to retrain producers of fired bricks operating on the banks of watercourses so that they can use an alternative, environmentally-friendly technology. The banks released by these brick-makers will be restored and some areas redeveloped for horticultural production by women and young people, which will contribute to food security, increased income and environmental protection.</p>

Goal: Preserve natural resources through use of durable construction materials

Specific objectives:

SO1 - Retraining artisans manufacturing fired bricks through promotion of an environmentally-friendly technology: the Compressed Earth Brick (CEB);

SO2 - Restoration and cultivation of the banks of watercourses degraded by fired brick production;

SO3 - Improvement of the regulatory framework and public policy to encourage use of CEBs.

SPECIFIC OBJECTIVE 1: Retraining artisans manufacturing fired bricks through promotion of an environmentally-friendly technology: the Compressed Earth Brick (CEB)

Result 1: CEBs adopted by builders and consumers, production and use techniques mastered by the retrained manufacturers and building contractors, traditional brick kilns no longer built, woodcutting reduced.

Principal activities planned:

R1A1 – Awareness-raising, information and motivation of brick producers, masons, carpenters, intermediaries and building and public works contractors concerning the advantages of CEBs.

R1A2 - Establishment of demonstration and training workshops for producers and masons

R1A3 – Monitoring and support for CEB producers and builders

R1A4 - Campaign to promote CEBs

R1A5 – Development of a local brick press

SPECIFIC OBJECTIVE 2: Restoration and cultivation of the banks of watercourses degraded by fired brick production

Result 2: Water courses protected through restoration and cultivation of banks degraded by fired brick production

Principal activities planned:

R2A1 - Development of degraded areas and horticultural production sites

R2A2 – Selection and purchase of woody species

R2A3 – Restoration of banks

R2A4 – Training of women in horticultural techniques

SPECIFIC OBJECTIVE 3: Improvement of the regulatory framework and public policy to encourage use of CEBs

Result 3: The local and national authorities take steps to encourage producers to retrain, encourage building and public works contractors to use CEBs and, in general, encourage the use of CEBs in public and private construction activities

Principal activities planned:

R3A1 – Identification of stakeholders at local and national level, making contact with the authorities to raise awareness of environmental issues and the benefits of CEBs

R3A2 – Participation in improvement of the Guinean National Housing Policy document (PNHG).

R3A2 - Assistance with the establishment of consultative forums on building and housing.

Total project duration	3 years
Budget estimate	USD 8,807,890

1 Background

1.1. Issues relating to the housing and construction sector in Guinea

In the Republic of Guinea, housebuilding is an activity involving the entire population and its management poses enormous environmental, economic, social and even cultural problems.

Exploitation of the banks of watercourses to produce fired bricks is one of the major factors in degradation of the banks. This activity, still widely practised these days, generates substantial income due to its economic profitability (the resources used are almost free) but also flourishes in an environment where cement is extremely costly and demand is very high.

Clay extraction to make fired bricks to supply urban centres causes serious damage to the environment. This practice is one of the main causes of degradation of vegetation, land and water, as clay pits are opened on the banks (and sometimes in the main channel) of rivers and their tributaries. Brick-making activity is expanding rapidly on the banks of a large proportion of rivers in Guinea.

The following observations have been made at the production sites:

- Undermining, erosion and collapse of banks;
- Degradation of vegetation cover on the banks, because operators are obliged for reasons of cost to use the woody resources available not far from the pits;
- The quantity of wood needed to fire the bricks is 21 m³ for 10,000 bricks, i.e. a total of 1,627,500 m³ of wood per year in the programme area;
- Fired brick production is an activity detrimental to the hydrological regime of the watercourses which it disrupts by exacerbating low water levels.

Guinea has varied forest resources with multiple uses. They extend from the humid primary forest in the South through the dry forests and wooded savannah to the grassy savannah in the North. Forest resources are exceptionally important in rural areas, being one of the natural resources directly available to the immense majority of the country's essentially rural population (more than 80%).

Although Guinea is party to various conventions on environmental protection, including the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification, vegetation cover is subject to rapid degradation. The total area of Guinean forests, estimated at around 13 million ha including savannah forests, is suffering an annual rate of deforestation of some 1.3%. The degradation of this forest heritage is due to the combined effect of a number of factors such as bushfires, shifting cultivation and the proliferation of brick kilns alongside watercourses. The latter is now attracting the attention of many environmentalists.

In Kankan, for example, an area in the savannah, there were 1000 brick kilns along the Milo river in 1980, but the count has now risen to more than 15,000. In other areas, entire watercourses have dried up as a result of this practice.

The practice of firing bricks contributes not only to the destruction of gallery forests but also to the degradation of the banks of watercourses. As the main watercourses flowing through the West African region rise in Guinea, it is easy to imagine the negative effects this environmentally unfriendly activity can have.

1.2. The existence of credible alternatives

In view of these observations, implementation of a retraining programme for fired brick manufacturers appears essential, encompassing the role and responsibility of all stakeholders, awareness-raising and training, the installation of workshops to produce the materials, organization of the artisans and the establishment of the entire value chain from production through to marketing and use of compressed earth bricks. At the same time, steps must be taken to restore and improve the degraded banks.

Because it does not use wood, the stabilized, compressed earth block technique (CEB) can considerably reduce the environmental impacts of fired bricks whilst enhancing income in the construction sector. In ecological terms, it helps to safeguard the banks, prevents erosion and sanding up of watercourses, provides protection against floods and stabilizes the hydrological regime of the watercourses. In addition, a brake is put on the destruction of vegetation cover.

In economic and social terms, development of the CEB sector is a way of encouraging the creation and management of both viable units to produce construction materials and small businesses connected with the building trade, as well as other economic activities. In other words, the spin-offs of the sector include the creation of sustainable jobs, the generation of substantial income and the reduction of poverty.

Use of this technique facilitates the supply of decent, comfortable homes and boosts the productive capacities of the decentralized authorities as local artisans are trained and master the technique, stemming the outflow of young people from rural areas in search of jobs and increasing the effectiveness of public subsidies to the rural municipalities through sedentarization of the beneficiaries.

Furthermore, the CEB is a cost-effective product, as shown in the table below.

Cost items	For 1 fired earth brick	For 1 CEB
Labour	GNF 300	GNF 120
Earth	GNF 0	GNF 500
Water	GNF 0	GNF 200
Cement or Lime or Sisal	GNF 0	GNF 650
Construction of the kiln	GNF 150	GNF 0
Wood	GNF 300	GNF 0
Depreciation of equipment	GNF 10	100
Cost of transport from the production site to the city	GNF 100	GNF 0
Sub-total	GNF 860	GNF 1 470
Rate of loss/breakage	25%	1%
Sub-total	GNF 1 075	GNF 1 484
Number of bricks needed to make 1m ²	37	28
Total price for 1 m² built	GNF 39 775	GNF 41 571

Figure 1: Comparison of costs, fired earth brick and CEB (source: APG-BTC)

The CEB is currently 4% more expensive than the fired earth brick but, if some of the cost of the press is covered by the project, the CEB would be cheaper than the fired earth brick.

In addition, it must be stressed that the price of wood has increased sharply over the last 10 years, particularly in Upper Guinea, and future rises will have a heavy impact on the production of fired earth bricks.

It should also be noted that the lead-in time for brick production is six times lower for CEBs than for fired earth bricks. In a context of heavy demand for construction materials due to rapid increases in population, CEBs are in a better position to meet needs due to their quicker production process.

Finally, it should be borne in mind that the programme to promote compressed earth bricks (CEBs) fits in well with the national biodiversity conservation and sustainable resource use strategy and the National Adaptation Plan of Action on Climate Change (NAPA-CC), adopted by the government in 2003 and 2007 respectively.

1.3. Environmental degradation exacerbating climate change vulnerabilities

Analysis of the available documentation in the National Forest Action Plan (NFAP) and the Agricultural Policy Development Paper (APDP) shows that the various development initiatives in Guinea have not taken account of the phenomenon of bank degradation.

The degradation of riverbanks is not mentioned as an environmental concern in any policy, strategy and/or project document, yet this degradation has reached worrying levels. It is therefore urgent to include efforts to combat this phenomenon in development strategies and activities.

Furthermore, according to the NAPA (2007), in some places watercourses will see a decrease in flow of more than 50% of the current average by 2100. This decrease will affect all regions of the country and the phenomenon will be extremely marked in the regions to the north of the 10th parallel. For example, from 2050 to 2100, the flow of the Niger will decrease by 16 - 28% at sensitivity 2.5°C and 23 - 54 % at sensitivity 4.5°C.

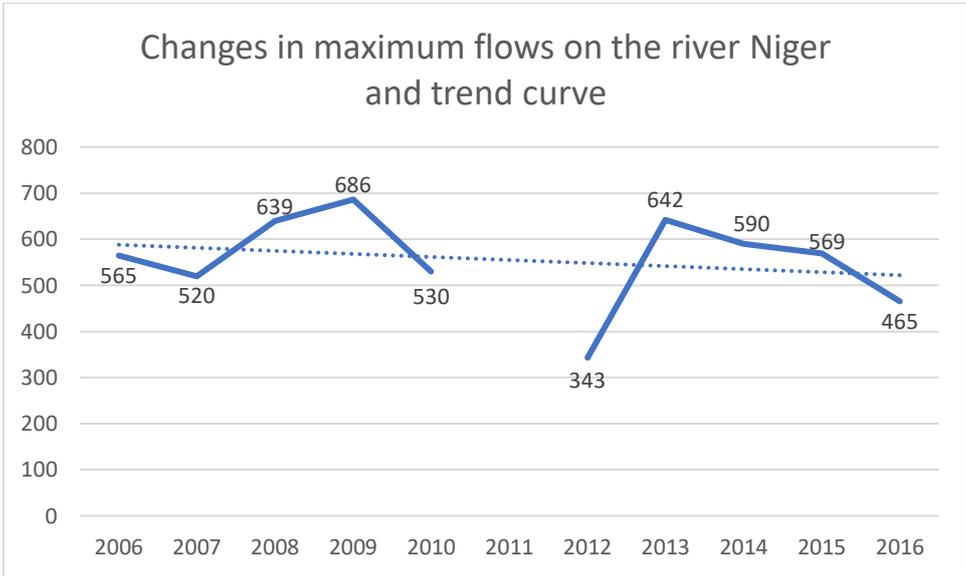


Figure 2: Changes in the maximum flow of the river Niger at Siguiri (source: Regional Hydrology Department)

Guinea’s hydric potential is based on rainfall. A number of previously perennial watercourses now cease to flow in the dry season these days. The status of water resources is influenced by phenomena such as sanding and silting up of the bed of some portions of rivers, streams, lakes and waterholes and localized pollution due to industrial, agricultural and/or craft activities. Looking to the future, it is clear that lower rainfall will have an impact on the flow of watercourses and possibly lead to the disappearance of some of them.

In areas where the banks have suffered serious degradation (former brick quarries) or been subjected to heavy human or animal pressure (washing places, watering places, etc.), appropriate hydraulic schemes can contribute to the work of restoration, consolidation and protection of the banks.

1.4. Guinea's principal commitments and activities in combating climate change and link with economic development priorities

On 7 May 1993, Guinea ratified the United Nations Framework Convention on Climate Change. Several documents of international significance were prepared by Guinea under the UNFCCC on combating climate change.

The National Adaptation Plan of Action (NAPA) on climate change, adopted by Order No. /2007/04305/PM/CAB/SGG/07 of 4 December 2007, is Guinea's reference strategy document on implementation of climate change adaptation activities. The NAPA puts forward a list of priority target projects for implementation to improve Guinea's adaptation capacity.

Guinea submitted its Initial Nationally Determined Contribution (INDC) when taking part in the 21st Conference of the Parties (COP) in Paris in 2015. This contribution gave Guinea an opportunity to stress the fundamental importance of taking account of climate change adaptation in the country's development process. Guinea's commitments in this respect include i) preservation of the quality and quantity of water resources for the benefit of the people of Guinea and the West African region; and ii) support for rural communities' adaptation efforts to develop agro-sylvo-pastoral techniques enabling them both to continue their activities and to preserve the resources on which they depend.

Protection of international rivers and water resources is one of the measures to be adopted in favour of the climate and the environment in Guinea. The proliferation of brick kilns is a serious threat to the implementation of that measure.

In 2015, the President of the Republic launched an initiative aimed at retraining the growing numbers of manufacturers of fired bricks who, in destroying the banks of the river Milo, are threatening that river's very existence. This involved supplying the town of Kankan with around a dozen high-capacity South African Hydraform presses, thereby demonstrating the commitment of the President and his government to the objectives set out in the INDC.

2 Programme logic

2.1 Strategic vision

Past experience in Guinea shows that simply supplying artisans with equipment does not help to achieve the desired objectives and does not ensure the continuity of the State's action or intervention.

The project's aim is to eliminate the active kilns proliferating along the rivers. These kilns are built by untrained young people seeking financial income to meet vital needs. If they are to abandon this practice, these brick-makers must be offered alternatives that can generate consistent, sustainable income to cover their basic needs.

This will require a combination of environmental protection strategies and deployment of an innovative, collective entrepreneurship programme which will fit into the local environment and encourage the emergence of a green production chain of construction materials. The proposed alternative must be an ecologically acceptable and relatively simple technique to ensure its ownership and mastery by an unskilled, uneducated labour force.

In addition, the material produced using this technique must have the right aesthetic and physical characteristics (durability, heat transfer and minimum noise), as well as being locally available and affordable. Acceptance of the technique and its integration in construction habits depend on all these factors.

The **Programme to retrain fired brick manufacturers** therefore encompasses the roles and responsibilities of all stakeholders, awareness-raising and training, the installation of workshops to produce the materials, organization of the artisans and the establishment of the entire value chain from production through to marketing and use of compressed earth bricks. At the same time, action will be taken to **restore and redevelop the degraded banks**.

The basic pillars of the programme's strategy will be as follows:

- Awareness-raising of operators, authorities and local people to be carried out by the fired brick-makers themselves, who will be trained and organized to do this using relevant tools;
- Demonstration of the stabilized, compressed earth block technique through the construction of model buildings;
- Training of artisans as masons and brick-makers, organizing them into co-operatives and provision of brickworks equipped with presses;
- Restoration of the banks, redevelopment of degraded areas, training of women in horticultural techniques and establishment of women's co-operatives;
- Supporting the establishment of consultative forums on building and housing.

Restoration of the banks and redevelopment of degraded areas will consist of putting low cut-stone walls or gabions in place; rectifying the slope of the embankments using the stone pitching method; filling in and compacting the former brick quarries; replanting places where the gallery forest has been destroyed and re-grassing the embankments where necessary; redeveloping and replanting rights-of-way and arable areas.

2.2 Programme area

The areas chosen for implementation of this programme are:

➤ **Upper Guinea region: Kankan and Siguiri prefectures.**

Kankan is the second city in the Republic of Guinea after Conakry and the largest in area, with a population of 473,359 spread over 7626 km² according to the third and latest Population and Housing Census (RGPH -3). It is located in Upper Guinea on the banks of the Milo, a tributary of the river Niger. Fired bricks are produced there on a large scale all along the Milo to meet the demand for construction materials, causing serious degradation of the banks and increased pressure on water and forest resources.

Kankan has around 11,000 brick kilns, with an average production of 10,000 bricks per kiln, i.e. a total of 110,000,000 per year.

Siguiri is the leading gold-producing area, hosting the Guinean gold company (SAG) and thousands of gold washers from various countries, resulting in high population density (695,449 inhabitants) in an

area of 7143 km². As a result, there is heavy demand for housing and mass use of brick kilns located on the river Baffing (Niger).

Siguiri has around 15,000 brick kilns, with an average production of 10,000 bricks per kiln, i.e. a total of 150,000,000 per year.

➤ **Middle Guinea region: Labé and Pita prefectures**

Labé: A town in the Foutah area experiencing strong economic and property market growth, with a population of 318,938 inhabitants (1164 km²). Demand for fired bricks is very high, with serious consequences for the rivers Manga Labé and Safatou.

Labé has around 8000 brick kilns, with an average production of 10,000 bricks per kiln, i.e. a total of 80,000,000 per year.

Pita: 278,530 inhabitants in an area of 1668 km². Pita has around 7000 brick kilns, with an average production of 10,000 bricks per kiln, i.e. a total of 70,000,000 per year.

➤ **Conakry region: Kindia, Coyah and Dubreka prefectures**

With 1,660,973 inhabitants and 236,771 housing units, the city of Conakry is the most densely populated in the country. CEBs manufactured in areas close to Conakry could supply the capital.

Kindia: fifth most populous city in the country, with 439,614 inhabitants, 62,872 housing units and an area of 9115 km². Kindia has around 14,000 brick kilns, with an average production of 10,000 bricks per kiln, i.e. a total of 140,000,000 per year.

Coyah (263,861 inhabitants; 35,892 housing units; 492 km²) has around 4000 brick kilns, with an average production of 10,000 bricks per kiln, i.e. a total of 40,000,000 per year.

Dubreka (330,548 inhabitants; 45,650 housing units; 1 680 km²) has around 5500 brick kilns, with an average production of 10,000 bricks per year, i.e. a total of 55,000,000 per year.

2.3 Programme description

2.3.1. Strategic component

This programme fits in with the drive for large-scale reinforcement of the CEB production and use sectors to reduce pressure on forest and water resources impacted by climate change in Guinea. Learning the lessons from previous programmes, the project will follow a value chain approach from training and monitoring of artisans through to measures fostering the emergence of favourable or even reserved markets for CEBs, via collaboration with contractors in the building and public works sector. It is not a matter of simply closing the brick kilns, but of providing fired brick manufacturers with an alternative brick production method, using an environmentally friendly technique which is more productive and profitable. The clay extraction pits to be abandoned by the artisans will be redeveloped for horticulture and the banks of water courses will be restored. This will give people access to both a more efficient construction material offering greater comfort and a better diet, thereby raising their living standards.

The programme is divided into three main components:

Component 1 - Retraining of artisans manufacturing fired bricks through promotion of an environmentally friendly technology (compressed earth bricks – CEBs).

Component 2 - Restoration of the banks of watercourses and redevelopment of degraded areas.

Component 3 - Improvement of the regulatory framework governing construction standards.

2.3.2. Goal and specific objectives

The goal of the "Retraining of fired brick manufacturers and restoration of banks degraded by this activity" programme is to preserve natural resources through the use of durable construction materials.

Specific objectives:

SO1 - Retraining artisans manufacturing fired bricks through promotion of an environmentally-friendly technology: the Compressed Earth Brick (CEB);

SO2 - Restoration and cultivation of the banks of watercourses degraded by fired brick production;

SO3 - Improvement of the regulatory framework and public policy to encourage use of CEBs.

Expected results

Result 1: CEBs adopted by builders and consumers, production and use techniques mastered by the retrained manufacturers and building contractors, traditional brick kilns no longer built, woodcutting reduced.

Result 2: Water courses protected through restoration and cultivation of banks degraded by fired brick production

Result 3: The local and national authorities take steps to encourage producers to retrain, encourage building and public works contractors to use CEBs and, in general, encourage the use of CEBs in public and private construction activities

2.3.3. Activities

In accordance with the expected results of the programme, the activities to be carried out are:

R1A1 – Awareness-raising, information and motivation of brick producers, masons, carpenters, intermediaries and building and public works contractors concerning the advantages of CEBs.

R1A2 - Establishment of demonstration and training workshops for producers and masons

R1A3 – Monitoring and support for CEB producers and builders

R1A4 - Campaign to promote CEBs

R1A5 – Development of a local brick press

R2A1 - Redevelopment of degraded areas and horticultural production sites

R2A2 – Selection and purchase of woody species

R2A3 – Restoration of banks

R2A4 – Training of women in horticultural techniques

R3A1 – Identification of stakeholders at local and national level, making contact with the authorities to raise awareness of environmental issues and the benefits of CEBs

R3A2 – Participation in improvement of the Guinean National Housing Policy document (PNHG).

R3A2 - Assistance with the establishment of consultative forums on building and housing

2.4 Expected effects and impacts

➤ Indicators of results

The programme expects to achieve the objectives listed below:

- The number of new brick kilns avoided will be 38,700 units
- The number of people retrained to use raw earth bricks instead of fired earth bricks will be 4300
- 11 raw earth brick quarries will be opened;
- The number of presses installed and operated will be 60;
- The quantity of CEBs produced will be 300,000,000 bricks per year by the end of the project;
- The number of houses built with CEBs will be 50,000 (at a rate of 6000 bricks per house);
- 1000 hectares of degraded banks will be restored and used;
- 3150 jobs will be created, of which at least 400 will go to women;
- The length of restored bank will be 15 linear km.

➡ Economic impacts

The people currently employed in manufacturing fired earth bricks will all be redeployed in CEB production, which requires labourers particularly to prepare the earth/cement mix, put it in the press and move the bricks to the drying area.

The people who presently supply wood to the brick producers will receive special attention; they will be offered priority membership of the group set up to cultivate the restored banks.

➡ Social and health impacts

There are three main health impacts:

- **Brick-makers' working conditions** will be considerably improved; they presently spend their days in the sun, with their feet in the mud, breathe fumes from the kiln and regularly suffer burns. When they move to CEB production, they will use equipment that facilitates physical work (press – transport of earth by lorry) and have a covered working area
- Areas flooded as a result of bank degradation pose an increased risk of **disease and epidemics** (cholera – onchocerciasis), which can be reduced by restoring the banks.
- Buildings made with CEBs offer much greater **thermal comfort** than those made with fired earth bricks or breeze blocks: around 4°C less inside the building, thereby improving the inhabitants' living conditions and representing a concrete form of climate change adaptation.

➡ Environmental impacts

This activity will also help to avoid the establishments of thousands of new brick kilns in areas particularly sensitive to climate change, such as Upper Guinea and Foutah Djallon. Traditional fired bricks are produced directly on the banks of the watercourses where the earth is extracted. The kilns are built on the same bank and use wood cut from the banks or nearby forests as fuel.

Replacing a form of production that uses huge amounts of wood (144 m³ of wood to make 10,000 bricks) with production that does not use energy directly will generate considerable savings in terms of greenhouse gas emissions, which will need to be quantified when finalizing the project.

2.5 Constraints and risks

Project implementation could be compromised by factors such as the failure of the local participatory process or the reluctance of contractors in the building and public works sector and the authorities, while others such as extreme climate events and weak involvement of women could have repercussions on ability to achieve the objectives.

2.6 Programme's transformational power

The project plans to carry out an intensive media campaign to publicize the product amongst consumers and the building trade.

In addition, the groups/co-operatives, entrepreneurs and press manufacturers will have to reimburse any financial support they have received, allowing the project to move forward and replicate the CEB production sites in pursuit of the aim to eliminate fired bricks from the construction market in Guinea.

Along the same lines, local brick press production units will be installed to minimize the costs of purchasing equipment. Imported presses currently cost USD 6500, which must be depreciated over three years. This is why the project plans to develop a local press, which would bring down the purchase price significantly for producers, thereby enhancing the competitiveness of CEBs and facilitating the establishment of new producers.

2.7. Programme steering

Precise steering procedures will be determined during the project note consolidation phase. Nevertheless, a preliminary outline would include the following aspects.

It is planned to involve an implementation partner in the programme (NGO or international agency) to ensure success. Contacts have been made with experienced partners and will be followed up depending on the appetite shown by donors.

The programme's stakeholders would have the following roles.

No.	Stakeholders/implementers	Role
1	Ministry of the Environment, Water and Forests/ DNE	Project monitoring
2	Ministry of Agriculture	Technical support on component 2
3	APG/BTC	Implementer of component 1
4	CERESCOR	Technical support on component 1
5	Ministry of Energy and Hydraulics	Institutional and technical support on water measurement stations
6	Ministry of Urban and Spatial Planning	Institutional support on component 3
7	Ministry of Territorial Administration and Decentralization	Institutional support
8	Prefectural authorities	Local level support
9	Local communities	Beneficiaries and implementers
10	National Local Development Department /MATD	Local community involvement
11	Ministry of the Budget	Contribution of the National Development Budget
12	FIG-DEB	Mobilization and awareness-raising on

		components 2 and 3
13	International NGO for implementation	Overall implementation, reporting and monitoring/evaluation

3. Human and financial resources required by the programme

3.1. Human needs

Preliminary estimates include at least the following needs:

One co-ordinator	One person in charge of retraining brick-makers
One person in charge of bank restoration and redevelopment of horticultural production areas	One person in charge of developing the local press
One person in charge of relations with the public authorities	One training and monitoring team for component 1
One training and monitoring team for component 2	One administration and accounts team
	One logistics team

3.2. Preliminary budget estimate

Expected results	Activities	Amount (USD)
<p>Expected result 1: CEBs adopted by builders and consumers, production and use techniques mastered by the retrained manufacturers and building contractors, traditional brick kilns no longer built, woodcutting reduced.</p>	Awareness-raising, information and motivation of brick producers, masons, carpenters, intermediaries and building and public works contractors concerning the advantages of CEBs.	278,700
	Establishment of demonstration and training workshops	106,400
	Training of brick-makers	77,650
	Training of masons	123,673
	Organization of artisans	513,650
	Management training for group members	
	Monitoring and technical and financial support for groups/co-operatives and building/public works contractors	210,000
	Public awareness campaign to promote CEBs	79,500
	Purchase of equipment for the manufacturers	250,500
	Development of a local brick press	128,000
	Construction of model buildings	145,800
	Sub-Total Expected Result 1	1,913,873
<p>Expected result 2: Water courses protected through restoration and cultivation of banks degraded by fired brick production</p>	Identification and redevelopment of degraded areas and replanting of banks	2,375,000
	Selection and purchase of woody species	750,000
	Development of horticultural production sites	1,273,000
	Establishment and operation of stations to monitor watercourse levels	950,000

	Training in horticulture	171,300
	Monitoring and technical and financial support for women's groups/co-operatives	208,000
	Sub-Total Expected Result 2	5,727,300
Expected result 3: The local and national authorities take steps to encourage producers to retrain, encourage building and public works contractors to use CEBs and, in general, encourage the use of CEBs in public and private construction activities	Identification of stakeholders at local and national level, making contact with the authorities to raise awareness of environmental issues and the benefits of CEBs	90,000
	Recruitment of an expert to improve the Guinean National Housing Policy document (PNHG (PNHG)	276,000
	Assistance with the establishment of consultative forums on building and housing	
	Sub-Total Expected Result 3	366,000
TOTAL		8,007,173
Management costs (10%)		800,717
GRAND TOTAL		8,807,890

Appendices

Logical framework

Hierarchy of objectives (Summary, operational logic)	Performance indicator	Monitoring mechanism (Means of verification, sources of information)	Assumptions and risks
Goal: Preserve natural resources through use of durable construction materials	The water level downstream from the restored banks The number of new buildings with CEBs	Establishment of limnometric stations downstream from the restored areas External evaluation	Failure of the local participatory process. No mass public acceptance of CEBs
Specific objectives (SOs)			
(SO1) Retraining artisans manufacturing fired bricks through promotion of an environmentally-friendly technology: the Compressed Earth Brick (CEB)	Number of artisans retrained Quantity of bricks produced	Monitoring report	Non-acceptance by producers of retraining proposals Inadequate participation of local authorities
(SO2) Restoration and cultivation of the banks of watercourses degraded by fired brick production;	Length of banks restored and number of hectares redeveloped Crop production on the restored banks	Report on availability of redeveloped areas Technical report on monitoring of production	Extreme climate events Insufficient farmer interest in the restored banks
(SO3) Improvement of the regulatory framework and public policy to encourage use of CEBs	Measures taken by the authorities to encourage participants in the supply chain	Decree promulgating legislation	Inadequate contribution from local authorities and Government

	Building standards and laws adopted		
Results (R)			
(R1): CEBs adopted by builders and consumers, production and use techniques mastered by the retrained manufacturers and building contractors, traditional brick kilns no longer built, woodcutting reduced.	Number of houses built with CEB's Number of new brick kilns after CEBs placed on the market	Visit report and housing statistics External impact study	Emergence of new materials in competition with CEBs
(R2): Water courses protected through restoration and cultivation of banks degraded by fired brick production	Water level downstream of the restored areas Areas restored and redeveloped Income generated for farmers cultivating the restored areas	Water level monitoring station Monitoring report External impact study	Difficulties with allocation of the restored land Sharp drop in the level of water courses
(R3): The local and national authorities take steps to encourage producers to retrain, encourage building and public works contractors to use CEBs and, in general, encourage the use of CEBs in public and private construction activities	Number of pieces of legislation passed and promulgated	Official Journal	Inadequate State involvement Political instability