

# POLICY BRIEF

## Socio-economic impact evaluation of the project Live With Water

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### PROJECT IDENTITY:

**Project's name:** Live With Water

**Funding scheme:** DFID

**Project's partners:** CRES, BG, GROUPE SENGHOR, NIYEL, REFDAF, EAWAG, TPH Swiss, University of BERNE, MRUHCV and EVE.

**Intervention's areas in Senegal:** Yeumbeul nord, Yeumbeul Sud, Grand Yoff, Djidda Thiaroye Kao, Malika, Thiaroye Gare, Rufisque Ouest, Medina Gounass, Whakinane Nimzatt et Mbao



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## INTRODUCTION

This policy brief presents a new analyzing approach of the changes induced by the strategies for building the resilience of populations to floods, in an urban context. Much research work has been done to measure resilience to climate risks, but, most of it is related to the resilience of rural communities and few are those oriented towards resilience to floods. Whereas, these last years are characterized by very frequent urban floods, due not only to a high concentration of the populations but also to the lawless constructions that can contain this demographic boom, which creates a favorable scope at the coming of the floods (Schaer, C and Hahonou, EK, 2018). The analysis of socio-economic resilience to floods in urban areas is very important since this type of environment concentrates a large part of the economic activity, and a possible shock could generate impacts on a very large scale, especially on the disadvantaged strata, who mainly operate in the informal sector.

### Box 1. Project Background

*Dakar, capital of Senegal, offers a favorable context for assessing the impacts of flood resilience programs, in so far as the problems related to this, have been persevering for more than a decade. With an urbanization rate of 96% and an area of 0.3%, it concentrates 23% of Senegal's total population as well as 40% of the country's economic units (ANSD, 2013). Since the revival of the rains in 1989, after a long period of drought, this side of the country is subject to frequent floods each time causing major damage and mobility of the populations.*

*In 16 of the 21 communes in the department of Pikine-Guédiawaye, the rainy season of 2005, affecting a large part of the suburbs of Dakar, caused the destruction of infrastructures, the outbreak of a cholera epidemic and the almost isolation of the city of Dakar from the rest of the country (Wade et al., 2009). In 2008 as well, they led to consequences at the social level (the mobility of 250,000 families), for education and health (flooding of 88 schools and 12 health stations). In 2009, they cost 103 million US dollars (US \$) in terms of expenses needed to restore the normal situation (rebuilding of houses, schools, health centers, roads). In 2012, the floods caused 26 lives lost, 264,000 disaster victims. In addition, they forced nearly 5,000 families to move, and led to the contamination of nearly 7,700 drinking water sources. In 2016, for instance, the World Bank estimated the value of economic assets vulnerable to floods up to 40 billion euros, in Dakar only, which is equal to nearly twice the country's GDP (Gross Domestic Product).*

<sup>1</sup> Climate resilience refers to "the long-term ability of a system or process to face extreme weather events and climate change and to continue to develop". - (BRACED Guidelines).

## Box 2. Hypothesis of the theory of change

The essential hypothesis of the project's theory of change states that the fact of reducing vulnerability, by improving the access to basic services combined with a self-organization improvement through a better community-based flood planning, by strengthening the knowledge and capacities at the community and national level and the dissemination of knowledge, will lead to increased individual resilience to urban flooding.

To validate this hypothesis, four sub-hypotheses were asked in terms of the socio-economic resilience of households facing floods:

- The project Live With Water (LWW) has contributed to reducing the costs related to floods borne by households and, to the improvement of their housing conditions;
- The rainwater drainage infrastructure allowed to reduce the proportion of the populations whose homes were directly affected by the floods;
- The project LWW has contributed to the diminution of the difficulties related to mobility of the populations during rainy seasons, but also all costs related to these difficulties;
- The project's support reduced the number of households whose incomes were lowered because of floods.

In addition, since the urban and rural contexts are completely different, it becomes important to develop appropriate approaches to each situation in order to measure resilience in a meaningful way. These considerations justify this research, which will be conducted using a theory of change approach to measure the economic resilience of communities to floods.

## EVIDENCE AND ANALYSIS

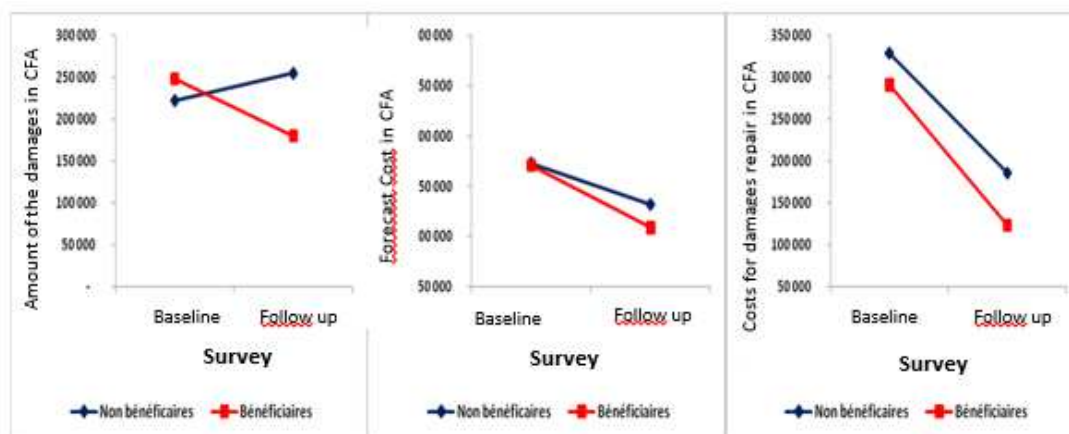
### *A diminution of expenses and losses related to floods, in the project's areas of intervention.*

The project interventions reduced the damages caused by the floods. The amount of the damages has decreased compared to the situation before the implementation of the project. It is the same for household expenditures in damages repair. The gap between the diminution of the amount of damages undergone by the project's beneficiary households and that of non-beneficiary households is estimated to **100 918 F CFA** average. For repair costs, the amount is **24 267 F CFA**.

In Yeumbeul Nord, where the interventions were completely accomplished before the last rainy season, the average costs of damages and damage repairs

decreased significantly into **668,524 FCFA** and **652,936 FCFA** respectively, compared to non-beneficiaries of the project in the same commune. Though, it seems that the positive impacts of the project occurred in a too short time to convince households to reduce their efforts to anticipate floods. The efforts of anticipation have dropped significantly.

**Chart 1:** Evolution of the different costs borne by beneficiary and non-beneficiary households before and after the project



Source: Based on the baseline and follow-up surveys of households exposed to floods in the suburbs of Dakar.

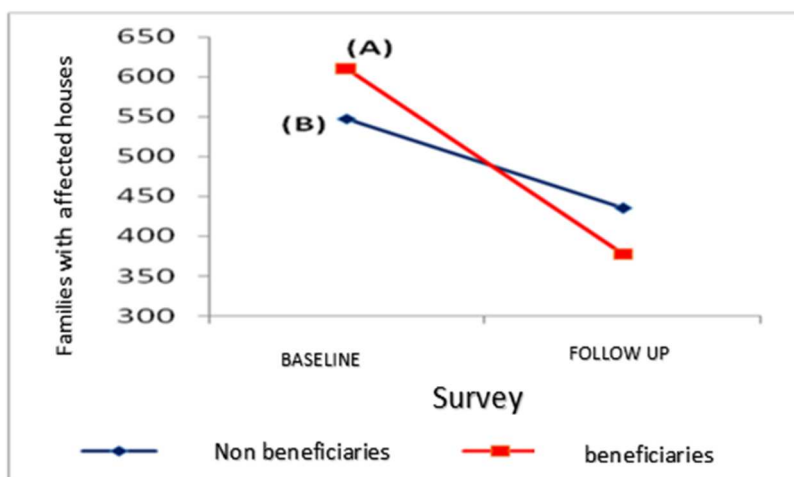
### Houses less affected by floods in project's beneficiary areas

Another result of the project is the improvement of the housing conditions generally affected by the floods. The number of households whose homes have been affected, has dropped significantly in the project's beneficiary areas. Even though the situation was more critical for the beneficiary households during the baseline survey (A) than among the non-beneficiaries (B), it was significantly improved after the implementation of the project.

**Chart 2:** Evolution of the number of affected households before and after the project's intervention

Thanks to the project LWW, families whose houses have been affected by the floods are almost 26% more likely not to live this situation again. But it should be noted that there is neither distinguished impact according to the level of exhibition, nor to the nature of the intervention. However, it is important to note that housing occupancy status plays an important role.

Source: From baseline and follow-up surveys of households exposed to floods in the suburbs of Dakar



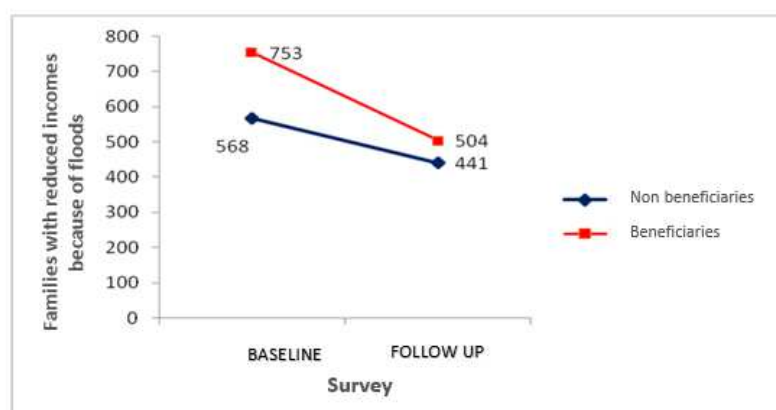
### A diminution of the rate of households having experienced a decrease of their income in the project's beneficiary areas

Thanks to the project's intervention, the number of households that experienced a decrease of their income during the last rainy season, dropped significantly more, among beneficiaries than non-beneficiaries by 6.6%. This trend is the same in the other nine communes when comparing the beneficiaries with the non-beneficiaries, but the impact is lesser (5.2%). The impact becomes more significant in Yeumbeul Nord (8.7%).

**Chart 3:** Evolution of the number of households affected by a diminution of their incomes before and after the project's intervention

To estimate the intensity of the impact by subgroup, we proceeded by stratification according to the socio-economic category to which the households belong. First, stratification by socio-professional status, shows that the project has mostly affected households with informal activities since they are generally more affected by floods. In the households where the head of the family is a trader or craftsman, there have been more impact by the project's intervention. If for the overall sample, the beneficiary households are 23% more likely not to be flooded in 2017, this impact is greater (36%) for the households headed by a craftsman or a trader. This stratification performed according to the income group of the household, shows that the project has no distinguished impact according to the group in which the household's income belongs.

Source: From baseline and follow-up surveys of households exposed to floods in the suburbs of Dakar

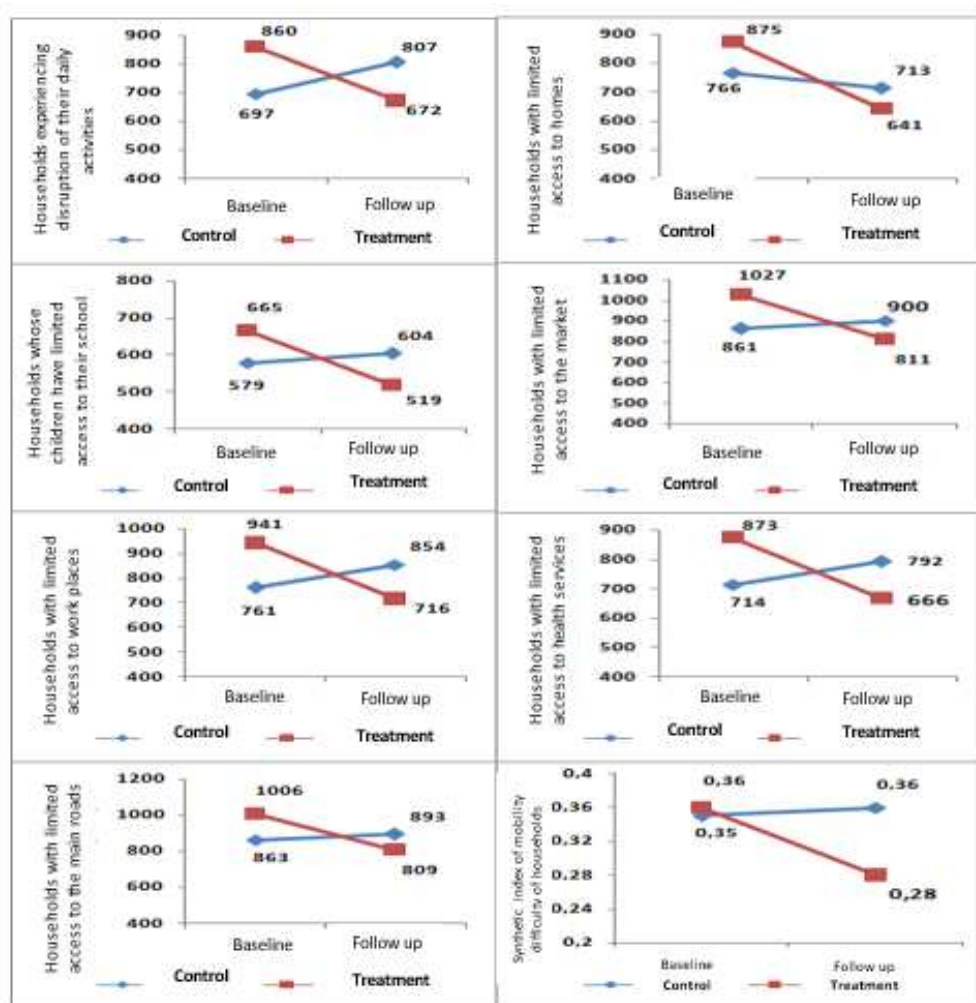


### Less mobility difficulties in the beneficiary areas of the project

Mobility difficulty is a serious attack to the daily running activities which populations are facing during the rainy season periods. Many households report having difficulties to access their home, market, school, or workplace...That can explain the decrease of their incomes and in general, their well-being. Chart 4 shows the evolution of the number of households who have had mobility difficulties and who have experienced disturbances in their activities during the periods of flooding, before and after the implementation of the project "Live With Water". In the non-beneficiary

areas, if the number of households living with difficulties, has increased except for access to housing, the situation significantly improved in the areas of intervention. Thanks to the project, there was a significant diminution during 2017 rainy season with regard to the number of households which experienced difficulties to have access to basic social services or whose daily activities were disrupted, or children who were unable to access their school, dropped significantly during the winter of 2017 due to the project.

**Graph 4: Evolution of the household mobility difficulty index**



Source: Based on baseline and follow-up surveys of households exposed to floods in the suburbs of Dakar.

A synthetic index of the mobility difficulty was built from the different variables of difficulty of access to the different needs (housing, market, school, health services, main roads...). This index is built in such a way that households with the highest values, are the most

affected in terms of mobility difficulties. The higher the index is, more the household is affected in terms of mobility difficulties. A slight increase is recorded among the non-beneficiaries while it shows a significant diminution among the beneficiaries of the project.

*On the whole, a clearly positive impact on the welfare of the project's beneficiary households, particularly those most exposed to the risk of floods*

To estimate the impact of the project on the households' welfare, a composite index was built while taking into account the economic, health and access to basic community service dimensions. The analysis shows overall, that beneficiaries are experiencing an improvement of their living conditions, especially in Yeumbeul Nord, where the impact is strongly noticed.

In the beneficiary areas of the nine other communes of intervention, the results are moving in the right direction. However, they have not yet reached the sufficient level, to induce a significant change. By the rainy season of 2018, the works will be able to show results.

## POLICY INVOLVEMENTS

### *At the level of decision-makers*

To fight against floods with multiple causes and huge potential impacts, it is necessary to promote a holistic approach through the achievement of a package of interventions intended to reduce all the dimensions of the affected populations' vulnerability. Beyond the implementation of rainwater draining infrastructure, the development of places which can be a source of lack of safety, the issues related to the reinforcement of prevention skills, management and adaptation, must be taken into account to better face floods.

It appears also essential to strengthen the communication and coordination system as well as the decision-making process at the local level. The

reinforcement of resilience involves all social strata. A formal organization in a committee of management, for instance, could create proximity between the authorities and the population, facilitating the union of strengths and skills to fight against floods.

### *At the level of the populations*

The sustainability of an intervention's achievements requires a strong empowerment of the beneficiaries. The non-functionality of flood control works is often due to a lack of ownership, which hampers their operation and brings them back to the original situation. Awareness-raising should be increased to convince all those people who are exposed to the risk of flooding to adopt a civic behavior towards the works.

## RESEARCH PARAMETERS

The project "**Live With Water**" aims to improve the well-being of vulnerable people face to floods in the suburbs of Dakar. Its main objective is to strengthen the resilience of the populations face to the floods in 10 peripheral communes of Dakar. For a strict assessment of the impact, the double difference method has been applied. This method consists of comparing the average situation of project beneficiaries with a similar control group, both before and after the project interventions. By control group, it is meant non-beneficiaries who are victims of flooding problems and who are at the same level of vulnerability as the beneficiaries but did not benefit from the intervention.

To evaluate the impact of the project, two sets of data are available from surveys that were conducted in two stages, in the treatment (beneficiary) and control (non-beneficiary) areas of the ten communes of intervention. The first survey (baseline) could help identify the situation before the project's intervention whereas the second (follow-up) was carried out after the intervention. In total, 2911 households (including 1381 in control and 1530 in treatment) were surveyed for the baseline and the follow-up covered 2625 households (1252 in control and 1373 in treatment). It should be noted that the same questionnaire was administered during the two surveys to the same households and the decrease of the sample's size.