



Congres FIIM-IFME / FAME May 2017



Urban resiliency and collaboration after earthquake 2010 in Jacmel, Haiti Emergency action and land structuring



Strasbourg.eu
eurométropole



architecture
sans frontières
INTERNATIONAL

L'Alsace
en partenariat
avec le Sud



ircod
Institut régional de coopération développement

afd
AGENCE FRANÇAISE
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Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
AMBASSADE DE FRANCE EN HAÏTI





Le Réseau des ingénieurs territoriaux

AITF : created in 1937

5.000 members in all the territorial and public institutions,

The whole range of engineering professions

Our goal : Belonging to a unique network of solidarity and information

Our organization:

- 19 thematic working groups
- 14 regional sections
- 1 committee of elders
- A Board of Directors (40 persons)

Benefit : from a very **comprehensive legal protection** (professional insurance)

- To be informed of technical, regulations and territorial status.
- **Partnership with the CNFPT** (National Centre of Public Territorial Fonction) for training programs.



To effectively fulfill our mission: proximity, technicality and efficiency

Our actions :

- ▶ The National Meeting of Public Engineering (RNIP): two days of workshops with the actors of the territorial world www.rnip.fr
- ▶ A website (www.aitf.fr)
- ▶ Information and training days at national and/or regional level
- ▶ A publication: the "Magazine of Territorial Engineering" , News from the association, Studies and thematic files, etc.

E-mail : aitf@opas.fr - www.aitf.fr



The practical case of today : **Urban resiliency and technical collaboration after earthquake in Haiti : cooperation for supporting emergency action and Land structuring in Jacmel (200.000 Inh.)**

« We can define resilience as the ability of a system to absorb a disturbance, to reorganize itself, and to continue to function in the same way, or even to improve functioning, as before the occurrence of this perturbation »

Here : the project of cooperation permitted to :

- ▶ intervene most quickly, (emergency aid)
- ▶ Facilitate structuring of public policies (financial and land resources, waste management services)
- ▶ limit the damage of eventual new earthquakes (earthquake-resistant construction and construction-companies training)



Mobilize a broad partnership of several multi competencies and actors.



United Nations Sustainable Development Goals in Haiti-Ircod project :



N°11 : “Make cities and human settlements inclusive, safe,
resilient and sustainable”

Context and goals of first technical cooperation : historical partnership and technical evolution (before earthquake)

Historical partnership and strong friendship between Jacmel and Strasbourg since 1991

- With the support of Ircod - Regional Institute for International Cooperation and Development

Capacity building program of the municipality of Jacmel since 2007 (co-financed by AFD)

Initial objectives:

« to strengthen the municipal institution and the priority services to the population »

- Urban cleanliness** - set up collection, transport and treatment of solid waste;
And reflection on a wastewater management policy
- Markets** - support for the project to rehabilitate the main market and its management
- Local taxation** - tax census, (120 000 inhabitants / 18 000 buildings) updating of the tax base and setting up conditions for a reinforcement of the municipality's own resources
- Administration and governance** - reorganization, technical training, implementation of management tools and procedures

Local context for Strengthening the participation of local civil society : a useful mix of technics and governance for resiliency

- The essential role of neighborhood associations for socio-educational and cultural actions, local mobilization, services to the population
- Beginning of discussions with the Management Service of Jacmel preschool centers (SGCPJ)
- Exchanges with Jacmel School of Music

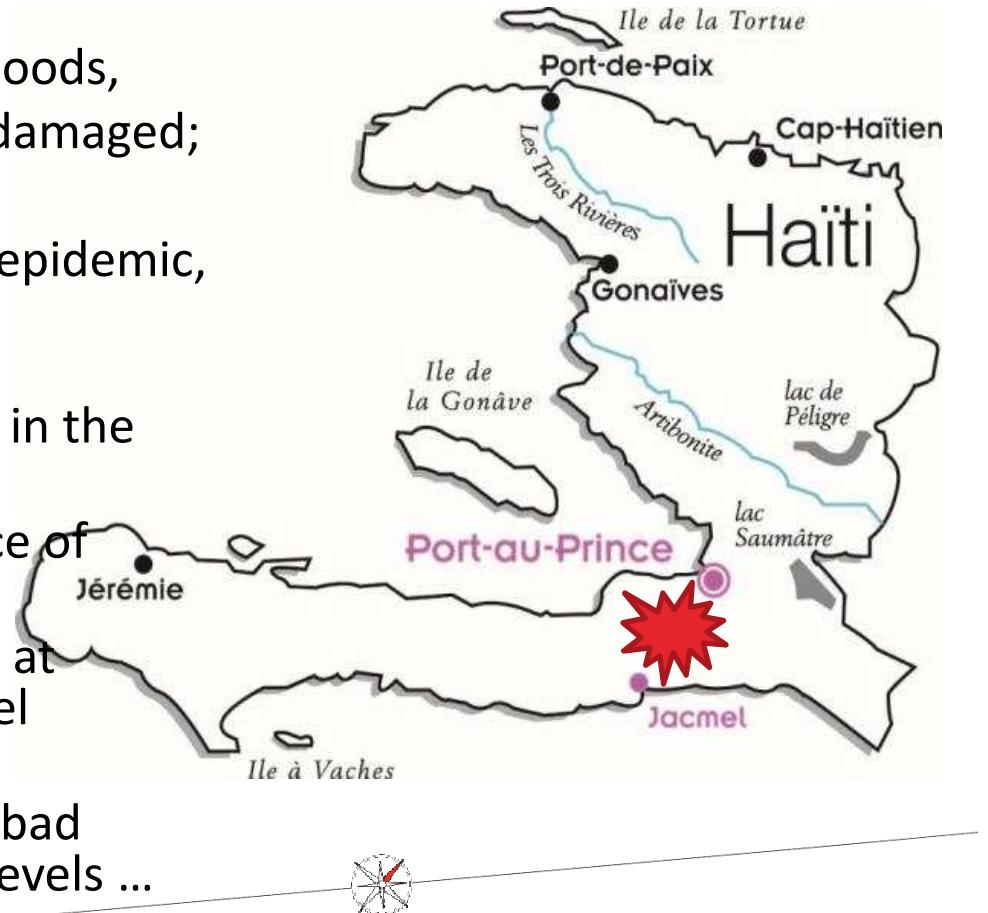


Photo crédit : Ircod
Ecole de musique de Jacmel

The 2010 earthquake and its impacts at Jacmel

City of Jacmel strongly affected (200.000 inhabitants)

- 60% destruction in some neighborhoods,
- 2,000 houses destroyed and 6,000 damaged;
- 15,000 affected families
- Dramatic health situation - cholera epidemic, particularly strong in Jacmel
- Institutional architecture destroyed in the literal and figurative sense;
- Communities left helpless in the face of emergencies
- General context of extreme fragility at institutional, political and social level
- Mass influx of aid, but poor or very bad coordination on national and local levels ...

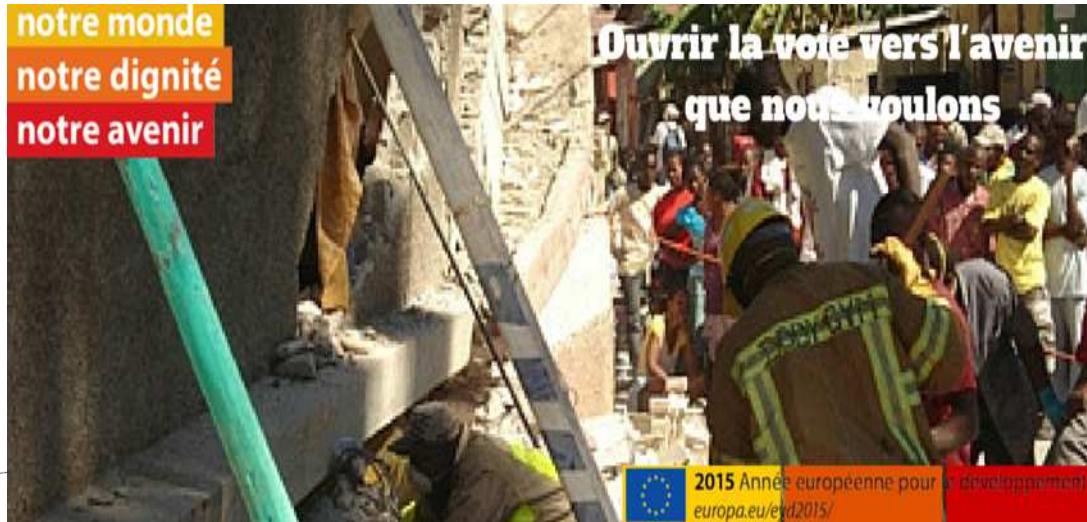


Carte d'

Strengthening resilience through targeted support to the municipal community around its strategic components

What we do :

1. Resizing and reorienting of the support of cooperation with involvement of engineers
2. Reinforcement of cartographic work, based on the geographic information system (GIS) developed before the earthquake **by using the satellite image** :
 - 2.1. to accelerate the field intervention (emergency)
 - 2.2. by identification of priority areas for intervention and reconstruction,
 - 2.3. by updating of cadastral surveys, status of post-earthquake buildings, creating a city map
3. Consolidation of the waste management plan, whose operability was essential in post-earthquake management (notably around the Interim « Burning and Composting Center »)



4. Developing training for new resistant construction



Photo crédit: Ircod
Support for the reconstruction of Jacmel

Innovation : The GIS solution used four specialties

- 1) **First, the geographic information system**, (followed by Michel Rosio, GIS and development sector at the **Eurométropole in Strasbourg**).
- 2) **Then, the satellite imagery** whose processing and the digitization method were assured by **the Sertit**

This choice of low cost and speed quickly became apparent in the face of the classic cadastral survey with surveyor (geometre), or usual GPS

A solid frame of reference has been realized: the contours have been digitized thanks to polygons marking the boundaries of the houses.

- 3) **After a test, the confrontation with the reality** was based on an essential **field team** managed by **the municipality of Jacmel & Ircod**)

- An information campaign took place before 60 inhabitants and 6 trained supervisors pointed in 40 living quarters, the land data, consolidating a comprehensive reference frame. Occupant status, comfort, access to networks were recorded and reported on the map.

- 4) **The multi-criteria statistical analysis**, (carried out by Benjamin Soulet, geographer in charge of GIS mission at the EMS).



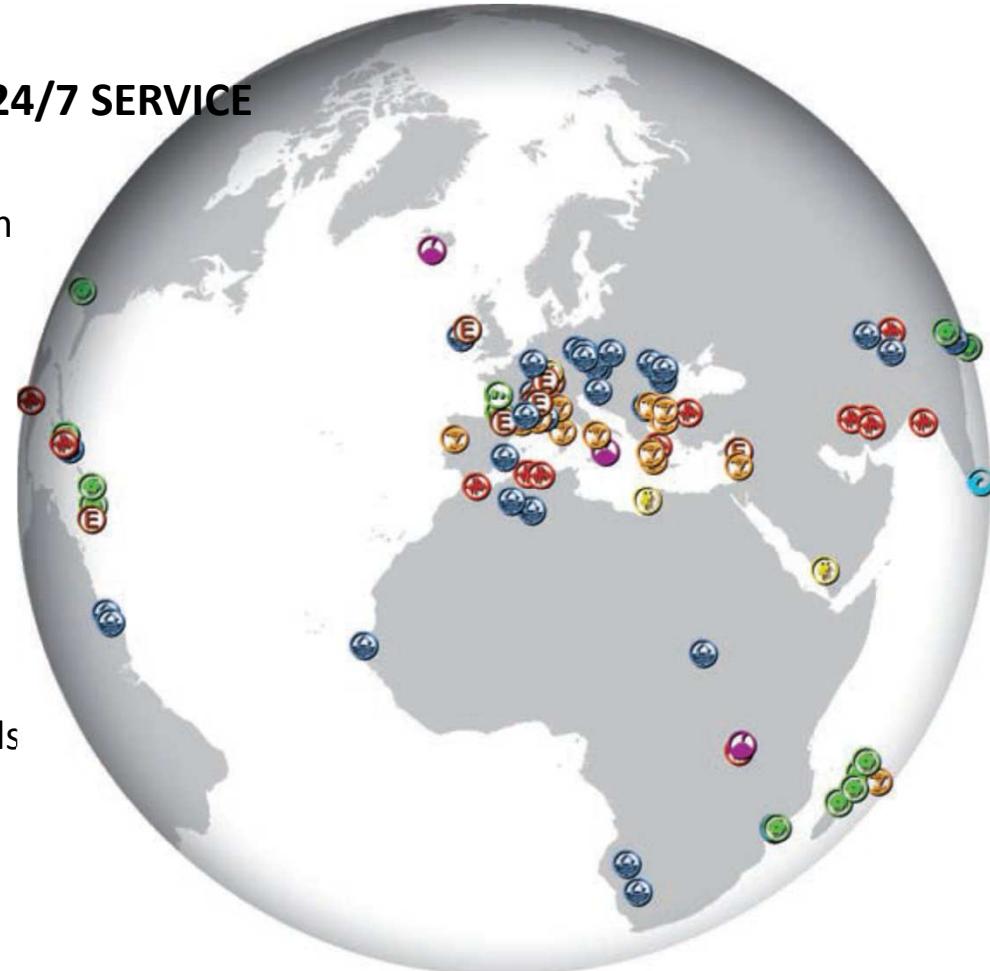
It finally get possible to classify the buildings, to detect those destroyed, compare them with those known for which a rent is collected and to define the amount of the local property-building tax.

With the help of the SERTIT : Regional Service for Image and Remote Sensing

DECISION AND CRISIS MANAGEMENT SUPPORT

Who is the SERTIT : RAPID MAPPING, AN OPERATIONAL 24/7 SERVICE

- A team of experienced engineers dedicated to the real-time production of crisis geo-information
- Within the first French university, a national and international actor in research projects :
 - Specification of future space systems
 - Image processing methods
 - Validation and qualification tools
 - Geo-information based expert systems
- ISO 9001 certified **production in 6 hours** for civil security services



Example : All crisis situations treated
In last 5 years by the SERTIT ...

With the help of the SERTIT

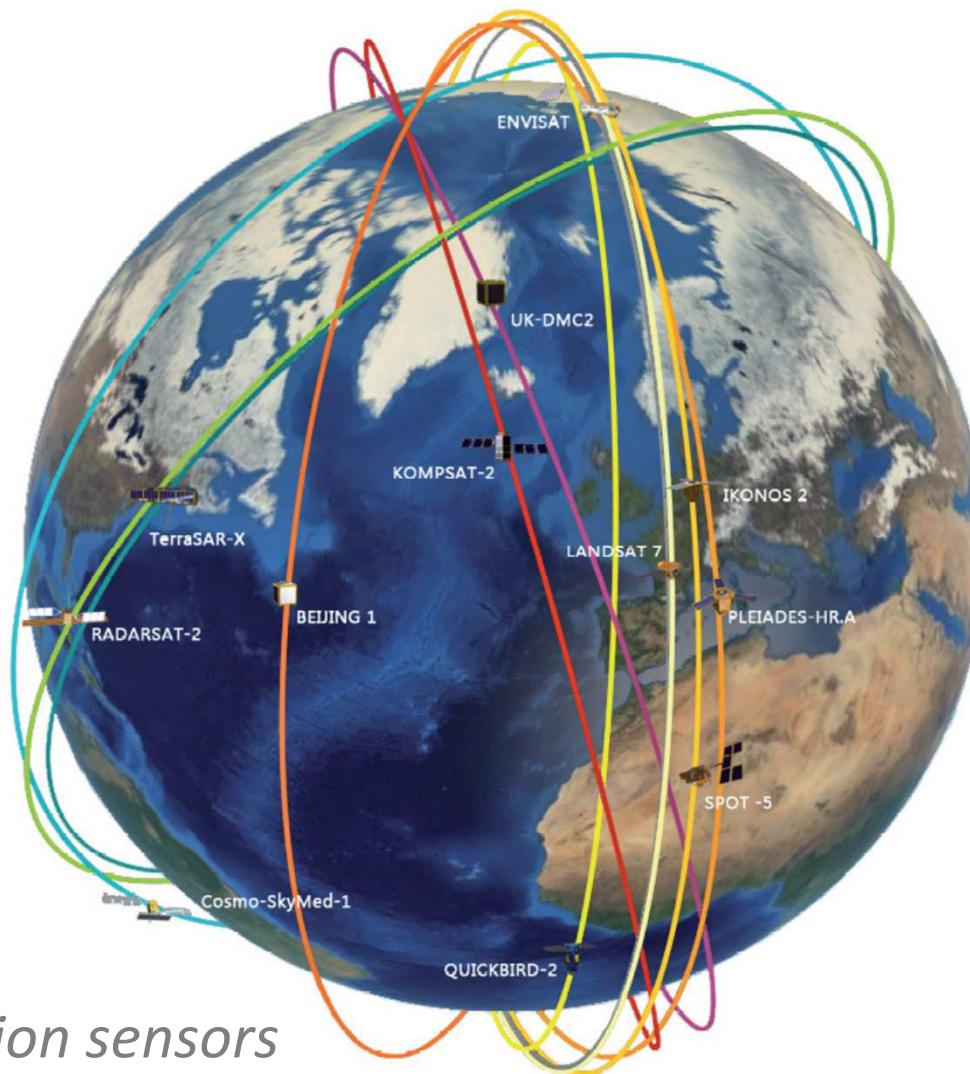
FROM EARTH OBSERVATION SYSTEMS TO EXPERT SYSTEMS

The SERTIT can make choices or influences used trajectories of satellites

to obtain a very recent satellite imagery

according to the unforeseen events to observe

Earth observation sensors



Focus on the GIS component, 1] land cadastre 2]status/conditions of the building 3] Establishment of a real estate tax base.

- 1) Creation of a good reference database (because GPS location too approximate)
- Entry of the frame layer (reference) January 2010 (very quickly after 12th january) :
Ground plan 20,000 validated buildings up to 1 / 200

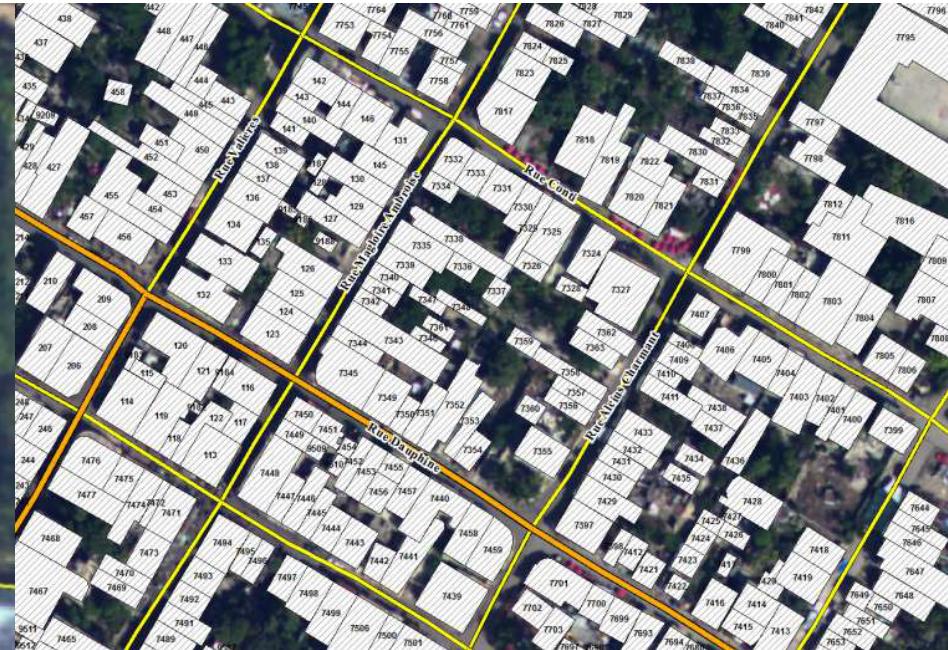


Photo crédit: Ircod
Appui à la reconstruction de Jacmel

A coherent database in 3 repositories: 1] geometry, 2] stakes 3] and impacts

Focus on the GIS component : 1st step] land survey



Source de la photo aérienne : mairie de Jacmel

- **2) Realization of field surveys** (from March to July 2010) to evaluate the damage, 8700 buildings are described by informing 29 topics/items
 - σ Establishment within the Jacmel municipality of the means to ensure the follow-up :
 - Recruitment of a local GIS administrator
 - Training in managing a database with MapInfo and Access tools
- **3) Consolidation of the data** recorded in an Access database georeferenced on the previous orthophoto of June 2009
- **4) Establishment of a geographic database** under MapInfo for waste management, whose operability was essential in post-earthquake management (notably around the Interim Burning and Composting Center)



Photo crédit: Ircod
Appui à la reconstruction de Jacmel

Zoom 3 : GIS component, land cadastre and state of the construction, Constitution of the atlas

Examples : The field survey, validation of the satellite ground plan, and field analysis, (on a grid of the town)



Monitoring of survey work in MapInfo



Examples of extracted map from GIS :
« Conditions of the building »

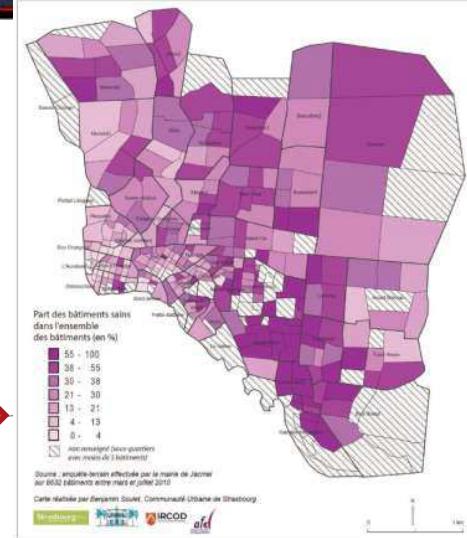


Photo crédit: IRCOD-EMS-SERTIT
Appui à la reconstruction de Jacmel

Zoom : Inventory of buildings after earthquake before reconstruction (ex Port –au-Prince)



Photo crédit: SERTIT
Port –au--Prince, Haïti

Zoom 4: Monitoring of the building conditions evolution

18 months evolution: between
January 12th , 2010 and
July 17th, 2011

2,962 new buildings (green) of
which 483 were still in
construction

698 buildings cleared
- 167 were already in ruins
at the time of the
earthquake
- 128 were under
construction
- 403 were healthy
buildings

18,597 buildings have not
changed status

Total inventory: 22,257 buildings



Photo crédit: Ircod-EMS-SERTIT
Appui à la reconstruction de Jacmel

Strengthening resilience of the city : support to the municipal community for collection of urban property taxes

Analysis of survey results and tax categories (local resources):



Yellow: Fully leased/rented building

Green: entirely occupied Building by owner

Red: Fully rented building with several tenants

Blue: Partially leased building



Photo crédit: Ircod
Appui à la reconstruction de Jacmel

Strengthening resilience: Teachings and capitalization of the GIS-remote sensing space program

1. The satellite imagery makes it possible to quickly establish a reference geographic database describing the frame with:
 - good completeness and
 - good geometric fidelity (evaluation of surfaces)
2. Satellite imagery is also an effective way to keep the database up to date
3. This database, published in the form of an atlas, is an effective support for field surveys
4. And in general, a relevant tool for territorial management, in particular the establishment of a municipal tax base (local resources), but also city plans, urban planning, waste management (basic services), etc.
5. In fine, a validated and transposable method

Transposability to be value

The solution "low cost (€ 260,000), fast and efficient" seduced the Haitian government, the Haitian Ministry of Interior and the French Development Agency (Afd), and even the « International Red Cross ».

Its transposition is envisaged to improve the governance of other communities.

The surveys provide valuable demographic information for planning the collection of household waste, future public facilities and networks, urbanization, etc.

CONTACTS : Eurométropole of Strasbourg and Ircod

Michel Rosio, michel.rosio@ems.eu, Benjamin Soulet, benjamin.soulet@ems.eu

Partners: the Regional Service for Image and Remote Sensing (SERTIT), the National Center for Space Studies (CNES), the Bureau of Geological and Mining Research (BRGM)

Strand 2: Medium-term support through strengthening local civil society and reconstruction

Complex local institutional context (turnover imposed by the State on the municipal team, as in most Haitian municipalities)

Refocusing of IRCOD support on social priorities, particularly on the early childhood sector, which is essential but little taken into account in aid programs, but with more autonomous governance



Recommendations and training of craftsmen for sustainable reconstruction
Architectural programming focused on anti-seismic and anticyclonic techniques

KIITOSthanks for you attention



Photo crédit : Architectes sans frontières (ASF)

ircod.org

Réalisations et durabilité

- **Reconstruction des locaux administratifs du SGCPJ**
- **Techniques de construction parasismiques et paracycloniques en maçonnerie chaînée (prévention)**



Photo 1 Harpage maçonnerie chainée



Photo 2 Locaux administratifs du SGCPJ

FICHE TECHNIQUE

Maîtrise d'ouvrage : Mairie de Jacmel et agents de terrains

Assistant à maîtrise d'ouvrage : Eurométropole de Strasbourg et Institut régional de coopération décentralisé (IRCOD).

Financement : Agence française de développement (Afd)

Partenaires : le Service Régional de Traitement d'Image et de Télédétection (SERTIT) , le Centre national d'études spatiales (CNES), le Bureau de recherches géologiques et minières (BRGM)

Coût : 260 000 €

Temps de réalisation : un an.



Partenariat pour la Reconstruction et Gouvernance du secteur petite enfance

- Service de gestion des centres préscolaires de Jacmel (SGCPJ), partenaire de Strasbourg / IRCOD
 - = Association locale en charge de **42 centres préscolaires** (**> 2 000 enfants de 3 à 5 ans**), toutes catégories sociales



Elle joue un **rôle essentiel dans l'accès à l'éducation des familles les plus démunies**

- Lourdes pertes lors du séisme : 9 établissements endommagés ou détruits / aucune aide publique sur ce volet « enfance » !
- Partenariat **IRCOD-Architectes sans frontières (ASF)** :
 - **diagnostic** précis du patrimoine détruit,
 - **évaluation du coût** des réhabilitations,
 - **préconisations et formation** des artisans pour une reconstruction durable
 - programmation architecturale axées sur les **techniques antisismiques et anticycloniques** et sur les **notions de fonctionnalité** des centres d'accueil

Photo crédit: Ville de Strasbourg
Mission d'échange – visite responsables du Service petite enfance de la ville de Strasbourg à Jacmel

Ex. Réalisations et durabilité

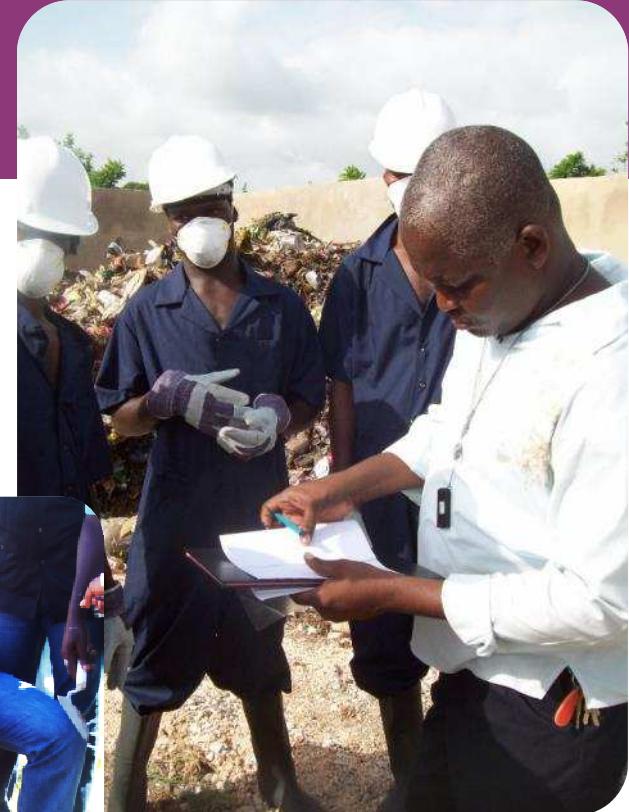
- Réhabilitation de la crèche *Le Soleil* dans un quartier particulièrement défavorisé



Photo crédit: Architectes sans frontières (ASF)
Centre préscolaire *Le Soleil*

Ex. Réalisations et durabilité

- Formation des ouvriers locaux à ces techniques
- Démarche environnementale : récupération et gestion de l'eau, panneaux solaires, renforcement dispositif d'assainissement
- Financement fonds d'appui des collectivités alsaciennes + MAEDI
- Suivi technique et formation en continu via ASF



Résilience urbaine à Jacmel : Eléments d'analyse et de conclusion

La résilience = un processus construit sur de multiples facteurs : gouvernance et organisation, moyens RH et financiers , outils techniques et innovations, partenariats ...

- À Jacmel : la coopération apportée avant et après le séisme a permis de bâtir une action ancrée dans la durée (outils de gestion urbaine, capacités de maîtrise d'ouvrage)
- Une réponse associant collectivité locale, société civile locale, acteurs de l'aide d'urgence, partenaires de la coopération (leadership communal ou local)...
- Une réponse nécessairement plurielle : urgence, reconstruction + anticipation, programmation, gouvernance dans la durée
- L'enjeu à court terme : soutenir la structuration des services locaux
- L'enjeu à moyen terme : anticiper / se préparer pour faire face à de nouveaux événements



Photo crédit : Architectes sans frontières (ASF)
Bâtiments administratives reconstruits

Conclusion :

Des conditions sine qua non pour une ville résiliente

Prendre en considération l'importance de :

- **la gouvernance**, (ex. mauvaise = Etat-Ville , ex. bonne = SGCPJ) ,
Corollaire : intégrer la valeur mais aussi les limites de l'appui institutionnel:
la meilleure des coopérations ne peut lutter contre les défaillances de gouvernance ; il faut pouvoir s'appuyer sur un leadership local (ou renforcer ce leadership au niveau territorial) et travailler aussi à l'échelon national.
- **la coordination de l'aide publique internationale**, surtout en situation de crise, ex: stratégies urbaines et foncières, structuration des services de base...
Corollaire : développer cette coordination à l'échelle des Etats et promouvoir un leadership à l'échelon territorial,
- **les opportunités techniques et l'innovation** : source parfois de gain de temps précieux (ex. télédétection spatiale, formation parasismique adaptée) ,
Corollaire : la coopération permet de renforcer l'efficacité des programmes des développements en articulant formation et promotion des personnels locaux de terrain avec l'innovation (ex. SERTIT) .
Développer la coordination des services nationaux , internationaux et locaux

SERTIT and satellite image

Space serving the EARTH

SERTIT provides decision aid support to governments, administrations and to large companies by using satellite imagery, made popular through Google Earth.

Today, meeting the 21st century's challenges, most notably concerning sustainable development and security, means getting the most out of Earth Observation satellites' global vision.

To reach this, the reliance upon mediators capable of linking space research and digital technology with operational user needs is a must. As an intermediary, the University of Strasbourg's service SERTIT is both a scientific reference, a Carnot Institute member, and a service provider, being ISO 9001 certified.

The SERTIT strengths and partnerships (Major Space Industry Players, regional authorities, the State, Space Agencies, and European Commission), make it a regional, national and European player now aims to increase its presence worldwide.

