

GLOBAL BLUEPRINTS FOR CHANGE

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The Global Blueprints for Change contain guidance for working together to improve the capability to identify indicators of physical, social, enterprise, and environmental vulnerabilities throughout the world and to select and implement realistic solutions to reduce them towards acceptable levels.

Theme A: LIVING WITH NATURAL AND TECHNOLOGICAL HAZARDS
Topic A.10 :Improving Urban and Land-Use Planning

“Urban and Land Use Planning in France”

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URBAN AND LAND USE PLANNING IN FRANCE

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INTRODUCTION

Urban planning joins up an area under jurisdiction with a town-planning project. Such a statutory document allows to set up a **land-use planning** in which the effects of the natural risks must be taken into consideration to create sustainable and safer communities.. As an urban area is a concentration of people, buildings, infrastructure and economic activities, its vulnerability is very important face to natural hazards. Earthquakes, for example, can destroy wholly a city - as in Gujarat (India, 2001) - because its location is in an earthquake prone area. Floods can destroy a part of city – as in Vaison-la-Romaine (France, 1992) – because urban settlements extended the flood plain of the Ouvèze river. In each case, **urban planning** and urban development did not take into account the natural risks. Everybody now agrees to reject fatalism. There are links between the built environment components and the vulnerability to the natural hazards impacts of each community.

So, what should we do and how should we do it, if we want to improve the professional practice of urban and land-use planning as a strategy to reduce the potential impacts of natural and environmental disasters?

1. BACKGROUND AND CURRENT STATUS ON URBAN AND LAND-USE PLANNING

What have we done in an European country such as **France**, for instance?

1.1 Land-use mapping

Cartographical expression to include development projects in a local area, leads to draw up a land-use mapping. In France, the “**Plan d’ Occupation des Sols**” (P.O.S) is the basic **statutory** document, including a map - **at the community scale** (usually 1:5,000) and a presentation report. This urban and land-use mapping divides the territory in urban zones and natural zones. Of course, **at the regional scale** (from 1:50,000 to 1:250,000), **land-use master maps** are attached to large development projects. But the community level is the most important for sustainable development with safer communities.

1.2. Natural hazards

According to their location, French communities are not only exposed to flooding, avalanches, forest-fires, landslides, and earthquakes, but also to hurricanes and/or volcanic eruptions in the overseas territories. Usually, their impact is regional **or** local and can be

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determined in each natural hazard-prone area , firstly at the regional scale (i.e., a seismic zoning map of a country) in the framework of master planning, **and** at the local scale (i.e., seismic micro-zoning) in the framework of urban and land-use planning.

1.3. Taking into account the natural risks in the land use planning

Since 1935, in France, we lay out mapping of the easily flooded areas (“submersible surfaces maps”, PSS in French) in which any construction or fence is under control, to keep free the running water. This procedure concerns several communities along the rivers and aims to reduce urbanisation into such an area. Later, **mapping of risks areas, at local level**, has been extended to landslides and avalanches, with floods (re. Article R.111-3 of the urban code) in order to control and, sometimes, to prohibit any construction or urbanisation in these natural risks prone specific areas. Only the **future** urban development was concerned by this regulation.

Since 1982, another law introduced prevention measures, which are to be carried out by owners as well as by communities or public establishments, not only in the **future**, but also **for existing** construction. This **law** set up the “Risks Exposure Plan” (**PER, in French**).

In 1995, a new law regrouped all these “tools” in only one, setting up the “**Risk Prevention Map**” (**PPR, in French**). This is a basic risks map at the local scale, to be shifted into the statutory land-use map (POS).

PPR **mapping** outlines the exposed zones to natural hazards. And an attached **report** prescribes the prevention measures to be implemented by both the private owners and the public organizations or the communities. In fact, mapping of landslides, earthquakes, floods and avalanches prone areas leads to prevention actions (urban and building prescriptions) to be applied in accordance with the regulations and the law :

- red zones (high exposed zones, related with high risk occurrence and high intensity hazards) where building is banned.
- white zones (un-exposed zones related with negligible risk occurrence) where there is no ban.
- blue zones, where the risk occurrence and the hazard intensity allow urbanisation and building, but under specific conditions to be respected (re. guidelines) and under control.

Such a PPR document – including a **natural risks mapping** and a **prescription report** - is shifted into land-use mapping (POS) **at local level**, in accordance with the law, and can be consulted by anybody.

Indeed, this document foremost is a good tool **to inform** both population on the risk exposure and decision makers to plan urbanisation, building, lifelines and industrial zones. Since 1991, a French **law gives a right to information**, for the natural risks exposed population

On the other hand, in France – where a specific **legal system** of disaster insurance has existed since 1982 – this PPR document is a **link between prevention and disaster compensation**. According to the corresponding regulation, - after a disaster – theoretically, no compensation can be expected by the owner of a non-authorized damaged building (located in a red zone), or whether PPR prescriptions are not respected

In France, there are 36,000 local communities, of which about more than 10,000 communities are at risk. At the end of the last century, about 2,000 PPR are performed (including the previous PER, PSS and “R.111.3 - risks areas”) and 2,000 others PPR are in progress. We expect to finalize the whole PPR programme – covering the 10,000 communities at risk – within ten years.

To carry out the PPR documents, several **methodical guides** have been elaborated under the responsibility of the Public Authority

The first one is a **general guide**, giving a methodology to the operator, in order to draw up the mapping and to establish the attached report including prescriptions in red and blue zones. Next ones are more **specific**. They concern flooding, landslides and littoral erosion risks; in each one, are presented successively a prevention policy reminder, the natural concerned hazard description, the method of risk analysis and risk mapping, at last the PPR file working out (guiding the studies and statutory disposals). The general guide points out more on the procedure, the strategy and the PPR impacts, as well on the land-use planning as on the information tool or the link between prevention and disaster compensation.

An even more specific guideline is devoted to the use of photo-interpretation. And the seismic micro-zoning guidance completes this gathering of guides. This specific “guideline for seismic micro-zoning studies” (directed by the French Association for Earthquake Engineering and published with the support of the Ministry of Environment, oct.1995) provides an easily accessible tool to the technicians to establish the technical report of the seismic micro-zoning. The prescription part of the file is under the Public Authority’s responsibility.

According with the law (1987 and 1995), **all risks prevention maps must be shifted into the land use mapping**; and the PPR prescriptions have to be respected in the red and blue zones, before urban and land-use planning, for the “future”. Concerning the “**existing**”, the land-use and the town-planning **projects have to be revised**, taking into account the potential effects of the natural risks.

With reference to another recent law (1995), population can be **expropriated** in some large sites at very high risk (as the landslide site “La Séchilienne”, near Grenoble, in the Alps). By reducing the vulnerability of these specific natural-risk-prone sites to collapses, landslides and flooding, the natural disasters are expected to decrease.

1.4. **Critical analysis of the PPR program**

The PPR maps are very good tools to contribute in creating sustainable and safer communities. However, face to the “existent” – hard to be modified –, and face to the “future” – with the uncertainties of mapping -, PPR tool has its limits.

Furthermore, performing PPR programs raises some complex problems, such as \ :

- the **test period** duration
- the program performing **duration** (in relation with the duration of each PPR performance –less than one year – and with the **training** of the specialized teams in charge of this specific work)
- the program **cost** (linked to the cost of each PPR performance), related to the direct and indirect losses from natural hazards, from an economical point of view.
- the working **scale** of the PPR maps. Usually, the 1:25,000 scale allows a first quick and costless approach of the taking into account the risks in the land-use planning.

- Nevertheless, sometimes, we must work at the 1:5,000 or 1:2,000 cadastral scale.
- the **Mayors and population adhesion** to the PPR strategy (the constraints of the PPR are considered as a brake to the communities development), linked to the societal perception of the program .
 - the **contents of the law**, that might be adjusted.

2. WHAT SHOULD WE DO TO IMPROVE URBAN AND LAND-USE PLANNING

Taking into account the acquired experience, the preferred process in France is considered to be as follows:

2.1 Setting up a master mapping of each natural hazards at a regional scale

- Earthquakes : **regional seismic zoning** of the country, to distinguish several zones prone to either weak, mean or strong earthquake activity, in which construction is under control..
- Volcanic eruptions : around volcanoes - in accordance with the type of activity (effusive or explosive) -, **rough drawing the dangerous volcanic areas**, in which population might be evacuated if there is a volcanic crisis.
- Landslides : at a regional scale, several types of “landslides”- as **collapses** of ground, resulting from the past mine or quarry activities , or **subsidence areas** linked to differential earth movements resulting from the dryness and re-hydration of the ground - can be **encircled**. On the other hand, rock falls and soil sliding occur usually in the mountain areas.
- Avalanches : at the regional scale, snow avalanches are localized so in the mountain areas where, nevertheless, avalanche channels can be pointed out..
- Flooding : lowland flooding - resulting from successive and sustained water precipitations , across large areas and over a long time - affects major watersheds ; **mapping of zones liable to flooding along the rivers** and tributaries have to be gathered in a book of maps in each watershed. Torrential floods affects **small watersheds**, usually in the mountain streams, but also anywhere after intense precipitations. Run-off flooding affects more especially urban areas (re. local scale mapping). Submersion and flooding of coastal areas – combined with high tide - concern sea-shore areas.
- Forest-fires : mapping of large forests at regional scale leads to point out the risks especially along **the forest-rims**, near the communities (re. local scale urban mapping).

The master land-use maps have to take into account this regional natural hazards mapping (scale 1:250,000) in every new developing project. It means, for instance, to avoid (1)development of urban concentrations and industrial zones in strong earthquakes prone areas, (2)urban development either in volcanic eruptions prone areas or in collapses (linked to past mining) prone areas, (3)urban planning either in flooding areas or in snow avalanche channels, or along the forests rims...

But, at the local level, it is necessary to establish a more accurate risks mapping, with specific prescriptions, in order to include these information into the local statutory documents, at the community scale.

2.2. Developing a natural risks planning at the local level

The aim is to outline a risk prevention plan program, at the local level (from 1:25,000 to 1:5,000). Each plan includes a **natural risk map** (from a natural hazard map within a vulnerability map) and a **prescription report**.

To implement this type of program, gathering of resources is necessary :

- (i) **financial** means (on the basis of not less than 30,000 US \$ per community, in France)
- (ii) a **legal basis** to authorize, in whole legality, the natural risk maps shifting into the land-use mapping.
- (iii) **qualified staff** to perform the natural risk prevention program (it should involve a training program for the teams in charge of mapping and reporting).

This staff should include **technicians** (geographers, geo-morphologists, geologists, hydro-geologists, hydrologists, volcanologists, seismologists, geo-technicians, etc. according with the type of natural hazard), historians, **sociologists**, **economists** and **jurists**. Indeed, we aimed to reduce the impacts of the natural hazards – in minimizing both any socio-economical disruption and the costs of the property losses - by technical means, on legal basis. Therefore, a **multidisciplinary team** has to be involved to implement the risk prevention plan program.

2.2.1. Natural risk prevention mapping

This mapping is flexible. It may concern either only one natural risk –if this one is very important (a flooding prone community) – or several risks. Usually, it concerns only one community, but it may involve several one, if these communities are disseminated along the same flooding prone river. Because the cost of local mapping is quickly increasing when the work-scale is up to 1:25,000 (until 1:5,000 and even 1:2,000), the program should include several steps, according with the vulnerability of each community.

To map the natural hazards and the vulnerability, the following works have to be performed :

- gathering the available data
- determining the hazard reference level (for earthquakes and floods, mainly)
- choice of the topographical map to be used (1:25,000 by example)
- drawing the limits of the natural hazard extension (or earthquake site-effects)
- vulnerability assessment
- zoning in blue, red or white areas (re. paragraph 1.1.3. above mentioned zoning), according with the potential impacts of the natural hazards on the urban development.

2.2.2. Prescription report

Two kinds of rules are expressed in this report :

- (i) **urban rules** : it concerns the location and the importance of the projects, including buildings, lifelines and communication systems of **the community**..
- (ii) **construction rules** : it concerns the specific **building** rules, referring to the “construction and habitation code” (hurricane and earthquake resistant code, for example). Building design, also, should be recommended at this stage, face to earthquake, hurricane and avalanche effects. So, a lot of houses is designed, in the hurricane prone areas as West Indies, to resist to the wind-effects. Isolated

constructions in the Pyrenees Mountains (West Europe) are designed to resist face to the snow-avalanche effects. A good and adapted design of the buildings in the seismic zones, contributes to reduce the earthquake effects.

Other prescriptions concern camping sites, quarries, and all development including embanking, retaining walls, crops, fencing, etc. Necessary information to manage, for instance, urban storm-water risks by using a scheme appropriate public areas has to be proposed.

Prevention and protection measures are prescribed, as works facing to floods, for instance. Both the “future” and the “existent” are concerned.

As indicated previously, implementation of these different prescriptions is based on **regulation** (urban development law), which should be scrupulously respected.

2.2.3. Taking into account **the feed-back** of urban and land-use **experience**

- (1) the **test-period duration** has not to be too long .. From the French PPR experience, we might test the program within one or two years (not more), to assess and to adjust the methodology on the field.
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- (2) according with the area to be covered by the program, its **duration** is more or less long. Nevertheless, it is a long way. Because the cost of the works and the number of qualified involved teams in charge of the program, several years - and yet several decades - will allow to establish an accurate urban and land-use planning of a whole country, taking into account the risks in the natural hazard prone areas.
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- (3) to perform such a program, we need money ! Now, in France, for instance, an average of more than 10 million US \$ a year is used to carry out the annual part of the works. At the beginning, the required **budget** might be less, during the test-period on the field and the training-period of the teams. But, after this period, means have to be gathered to complete the program as soon as possible, at least at the 1:25,000 scale, on the higher natural hazard prone areas.
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- (4) from a regional natural risks mapping, the advised **scale** to establish the land-use planning is 1:25,000 to cover the natural hazard prone areas within a short period. But, complementary works have to be anticipated, as soon as possible, to map at the 1:5,000 scale (or at the cadastral 1:2,000 scale) the most dangerous areas in the communities.
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- (5) because both the Mayors and the population adhesion is necessary either to adjust the existing land-use planning or to draw a future urban and land-use planning, a **sociological program** has to be associated to the technical program in each concerned community. Often, the societal perception of the natural disaster by the population in the field – linked to believes and to fatalism – must change. This type of approach is very important ; indeed, population have to understand that safety, sustainability and quality of life in the communities, are linked and result from a “taking into account the risks” in the urban and land-use planning of each community.
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- (6) to give a **legal basis** to the recommendations and prescriptions to be respected, the content of the law has to be adjusted, aiming the three functions of the land-use documents, as follows :
 - . (6.1) to inform population on natural disaster to which they are exposed (in respect of a **legal right to information** to be voted)
 - . (6.2) to create a link between prevention and compensation (in respect to a **legal right to compensation** after a natural disaster)
 - (6.3) to take into account the natural risks in urban and land-use planning (in accordance with a **legal right to live in a safety and sustainable community**).
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 - The two last functions (6.2 – 6.3) are associated with the following condition : “ **IF** the construction has not been built either in a natural-hazard-prone area, or in accordance with the specific attached prescriptions..

3. HOW SHOULD WE DO IT ?

Referring to the above mentioned actions to be performed and aiming at a safety and sustainable community, we present below the preferred process in the **developed countries** to promote and advance implementation. Of course, this process might be adjusted in the **developing countries**, where everything is to do, where there is no legal basis, where funds are missing, where priority is elsewhere, because the societal perception of the natural disaster is rather attached to fatalism and has not yet changed.

Who is in charge of the risk areas mapping ? The **Government** (the Public Authority) has “to say the risk”, because the right to information. This work concerns the regional level (scale 1:250,000) and the first step of the local level (scale 1:25,000) . The second step – risk mapping at the cadastral scale 1:2,000 to be shifted into the land-use mapping – must be in charge of **the communities**, as a part of the planning development process.

Funds are coming from the Ministries in charge of the prevention (Civil Protection or Environment ?) to perform the programs at the regional level and at the local level (first step). But the communities have to support the second step of the local level – as a part of the planning development process - eventually with the help of other donors. The regional Administration might participate to finance these operations. Taking into account the high cost of the risk prevention program, budget has to be dispatched on several years (or decades). Nevertheless, it is not so important facing to the natural disaster cost.

In any case, the works have to be performed by **specific teams**. As we need to respect the guidelines, a good training is necessary to get this guarantee.

According with the country means – specially in the developing countries - programs have to be established in order **to work step by step** : (1) **priority** to the risks areas mapping at the **regional scale**, to adjust the land-use mapping in drawing up the master-plans; (2) **priority to the higher natural hazards prone communities** at the local scale, after a due selection, in implementing the land-use and urban planning.

4. PRIMARY ISSUES, RECOMMENDATIONS

To overcome the barriers to increasing the resiliency and sustainability to natural and environmental hazards, four conditions are vitally important to the urban and land-use process :

- (1) available data collection must include the **feed-back experience teaching** – from natural disaster cases histories - with the historians support.
- (2) societal perception analysis must include **individual and group behaviour studies**, specially during debates with population and decision makers, aiming the risk appropriation by the prevention actors.
- (3) **multidisciplinary teams** have to be involved altogether in the land-use process, to break the walls between technicians, sociologists, historians, economists, jurists, etc.
- (4) the bottom base of the works is very important ; **Approaches from the top down and approaches from the bottom up have to be associated.**

Keep in mind that the urban and the land-use planning process, which takes into account the natural risks, and which aims at communities becoming disaster resistant, sustainable, and safer over time, is a very, **very long process**. It will take time!