

EVALUATION DES POLITIQUES PUBLIQUES DE GESTION DES INONDATIONS AU JAPON

RAPPORT DE L'OCDE

Yves KOVACS¹ et Ségolène FORESTIER^{1*}, *SEPIA Conseils*

Ulf BJURMAN, *Agence Suédoise des Services de Secours*

Reza LAHIDJI, *Consultant indépendant pour l'OCDE*

Barrie STEVENS, Jack RADISCH, et Pierre-Alain SCHIEB, *OCDE,*

Programme de l'OCDE sur l'avenir

1. *SEPIA Conseils, 53 rue Turbigo, 75003 Paris*

Tél : 01 53 01 92 95 (standard). Fax : 01 42 71 85 24.

2. *OCDE, 2, rue André Pascal*

F-75775 Paris Cedex 16, France

Tél : 01.45.24.82.00 (standard). Fax : 01.45.24.85.00

**Courriel : sf@sepia-conseils.fr*

Résumé

Méthodologie

En coopération avec le gouvernement Japonais, le programme de l'OCDE sur l'avenir a entrepris en 2006 une évaluation de la politique Japonaise en matière de gestion des inondations.

L'équipe sélectionnée par l'OCDE en charge de cette évaluation était composée d'experts indépendants. Suite à une étude préliminaire, l'équipe d'experts s'est déplacée au Japon pour interviewer des membres du gouvernement, des collectivités locales, des associations non gouvernementales, et différentes organisations publiques ou privées impliquées dans le risque inondation. L'équipe a également participé à un exercice d'alerte, de confortement de digues et d'intervention des équipes de secouristes sur la rivière Tone. Cette phase de consultation des acteurs a permis d'identifier les spécificités Japonaises et de proposer des mesures de renforcement de la politique actuelle.

Rendu

Le contexte Japonais vis-à-vis des inondations est unique au sein des pays de l'OCDE. Du fait de sa géographie, de sa topographie et de son climat, le Japon est soumis à des inondations fréquentes et de grandes ampleurs. En outre, étant données les fortes contraintes d'espace et de densité, près de la moitié de la population et les trois quarts des biens économiques sont concentrés en zones inondables.

Pour répondre à cette situation, le Japon a développé un très haut niveau d'expertise dans la gestion des inondations, principalement dans les aménagements structurels de digues, les barrages, et les technologies de prévision de crues et de communications de masse en temps de crise.

Néanmoins, dans un contexte de réduction budgétaire et d'augmentation du risque due au changement climatique, au vieillissement de la population, et à la croissance de l'urbanisation en zone inondable, le Japon doit faire face à des défis croissants.

Si les solutions passent par une amélioration continue des mesures structurelles déjà développées, elles doivent s'accompagner d'un développement de mesures non structurelles qui concernent :

- *la création de compétences au niveau local, la coordination à toutes les échelles de décision, et la transparence de la réglementation,*
- *l'évaluation de la vulnérabilité de l'existant, et l'intégration de la problématique inondation dans le développement urbain et les règles de construction,*
- *l'organisation des secours,*
- *la planification, la préparation, et le financement des phases de reconstruction.*

Mots-Clés : *coordination politique, réduction de la vulnérabilité, évaluation et prévention du risque, secours, reconstruction.*

1. Foreword

The following study is an extract of a not yet edited OECD report “Japan – Large scale Floods and Earthquakes”. The report will be available on line at the OECD Bookshop from the 9th of March 2009 (<http://www.oecdbookshop.org/>).

The conclusion is based on the Press Release elaborated by the OECD for the Press teleconference on the 26th of June 2008 at the OECD Centre, Tokyo.

2. Introduction

Japan is in a unique situation compared with other OECD countries. Due to its geography, topography and climate, it is subject to frequent typhoons, torrential rains and heavy snow falls, and has a long history of serious flooding. About half the population and full three-quarters of its economic assets are concentrated in flood-prone areas, and almost five and a half million people live in areas below sea level.

Over the centuries, Japan has developed an extraordinarily high level of expertise in dealing with floods. It is renowned worldwide for its engineering feats in the construction of flood defences - channels and embankments, retention basins, river floodways, dams, super levees, and more recently its integrated strategies combining flood control, water use and environmental protection. It is also a world leader in the use of highly sophisticated technologies in advance flood warning, data collection and analysis, risk assessment, communication, and protection of critical infrastructures. Hence, Japan's structural flood defences have progressed considerably, and this despite significant reductions in capital budgets in recent years

As the country has accumulated ever more experience in tackling floods, it has continually adapted and updated its laws and regulations on the basis of the lessons learned, and has modernized and refined its flood management techniques. Japan has now developed a Total Disaster Management System that is a seamless cycle of prevention, mitigation, preparedness, response, recovery and rehabilitation -- a system that encourages strong national leadership and multi-sectoral co-ordination, and serves Japan well in dealing with the small and medium sized floods that frequently occur.

But in several respects, Japan is now entering a new era. Against the backdrop of climate change, sea levels are expected to rise, precipitation patterns to change, and extreme weather events to increase. At the same time, the country's vulnerability to flooding is expected to grow due to the denser occupation of flood-prone urban areas, and its ageing population.

Bearing such context in mind, this review sets out Japan's achievements in flood control, highlights Japan's best practices in terms of engineering works, technical installations and devices used for prevention and protection as well as disaster management. It also offers a perspective on possible improvements and alternative courses of action, notably in respect to non-structural measures.

3. Methodology

A preliminary OECD study conducted in 2006 formed the basis for a general, self-assessment of flood disaster management, which in turn led to a review team mission from 14-19 May 2007 to conduct interviews with civil servants from the national government's Cabinet Office, relevant ministries and agencies, as well as the regional and local level organization of the Ministry of Land Infrastructure and Transport (MLIT). Representatives from a few local government authorities were also interviewed, including the City of Tokyo and the Saitama Prefecture. Among the businesses that participated in the review were construction, manufacturing and insurance companies. The review team also attended a large-scale and ambitious drill against flooding in the Tone River.

The team that carried out the review consisted of: Ulf Bjurman, Senior Advisor on Civil Protection and Crisis Management, Previously Head of Department, Swedish Rescue Services Agency; Reza Lahidji, Consultant in Risk Management Policy for the OECD Secretariat; and Dr. Tsujimoto, Professor at Nagoya University in flood countermeasures studies. The team was led by Dr. Yves Kovacs, Consulting Engineer and Expert in Flood Management. Barrie Stevens and Pierre-Alain Schieb of the OECD Secretariat provided guidance and overall direction.

4. Results and discussions

The following section gives the results of the studies in respect to the 5 fields which all together allow an integrated flood management strategy:

- × Integrated approach to flood risk management (general policy),
- × Risk assessment and communication,
- × Flood prevention and damage mitigation,
- × Emergency response,
- × Recovery.

Analysing the Japanese context, the report ends up with 14 recommendations.

4.1 Integrated approach to flood risk management

4.1.1 A cross-sectoral approach to flood control at the central level

Japan possesses a comprehensive and strategic disaster management system elaborated in the Disaster Countermeasures Basic Act, which has been enhanced following lessons learned from different large scale disasters. The system covers all phases of disaster management: prevention, mitigation and preparedness, emergency response, recovery and rehabilitation. Further, it clarifies the roles and responsibilities both of government at national and local levels and relevant stakeholders in the public and private sectors who cooperate in implementing various disaster countermeasures.

The overall national strategy for flood risk management is defined at the highest level by the combined work of the Cabinet, the Cabinet Office and since 2001 the Central Disaster

Management Council. These public bodies collaborate in the development of the national strategy and coordination of actions and policies that are implemented on a practical level by various ministries and agencies.

Findings

The necessity to involve various ministries and agencies to achieve a holistic flood disaster management requires that strong coordination and leadership is exercised. Although central government bodies control implementation of national policies, the use of inspections and evaluations to review the strategies and to monitor the coherence and efficiency of action taken within the holistic flood risk management system should be used more systematically.

Opportunities for Action

At present, the separation in central administrations between responsibility for protection measures, prevention and preparedness measures and response measures should be addressed to achieve stronger cooperation under the coordination of the Cabinet Office. Closer collaboration between bureaus of the same ministry, for example the River bureau and Land Use bureau of the MLIT, should be fostered to achieve more integrated implementation of policies. Certain aspects of central and local government relations could benefit from more developed cooperation. Evaluation of measures taken by separate ministries should be conducted to assess and control their coherence with the national overall strategy for flood risk management within the overall disaster management cycle.

Recommendation 1. The Central Government needs to have a stronger coordination role and more effective tools for enforcing implementation of coherent disaster management policies.

4.1.2 Coordination of actions and strategies between central and local level

Under the Disaster Counter Measure Act, prefectures and municipalities implement local disaster management plans in line with global strategies of the overall national strategy for flood risk management under the leadership of the central government.

Specific laws constitute the legal framework setting-out the responsibilities of central and local levels of government. For example, the Disaster Relief Act tackles the response stage, whereas the River Law deals with river improvement projects, which include the construction of flood protective devices such as dykes or dams.

A system classifying rivers according to their importance determines the level of government administration involved. For medium and small size rivers, flood management is fully the responsibility of local governments, namely prefectures and municipalities.

For class A rivers, which are considered of national importance due to the high number of people and economic assets at stake, the Ministry of Land, Infrastructure, and Transport (MLIT) is in charge both of developing protection strategies and managing the necessary flood protection measures. Responsibility for implementation of prevention, preparedness and emergency response measures mainly falls to local governments.

Findings

For large-scale floods prevention and management strategies, cooperation between various concerned administrations at central and local levels to implement prevention, preparedness and emergency response should be strengthened. Though the current structure is consistent

with the high level of risk in Japan for specific rivers, there is room for more involvement of local governments, river basin committees, stakeholders and interest groups.

Successive development of new laws based on evaluation and integration of past experience has proven to be very successful in improving disaster management policies. At the same time it has led to a somewhat piece-meal and dispersed legislation, which could stand to advance a clearer overview of roles and responsibilities and overall transparency. The density of the legal framework, in conjunction with its high level of economic and technical exigencies, compels the introduction of capacity building for local actors to foster the implementation of disaster management policies. For its part, the central government needs to be given more appropriate tools to evaluate and inspect local policies and offer them feedback and advice.

Opportunities for Action

Cooperation between the central government authorities and local governments needs to be strengthened. To this end, the capacity of local government administrations to react to floods needs to be enhanced through designated training and education programs.

In parallel, a system could be introduced through which a designated central administrative body such as the Central Disaster Management Council collects and monitors local experience and schemes for coordination, as well as evaluates and analyses local needs and proposals for improvements.

In order to make the National Risk Management Strategy more accessible to local governments and to help them understand their precise roles and responsibilities, a review with the aim of improving transparency and streamlining the current legislation could be considered. The further development and introduction of River Basin committees should also be considered taking into account the success such committees have proven to have in other OECD countries.

Finally, given the possibility that embankments could be damaged by an earthquake, leading to serious flooding of inhabited land areas below sea level, coherent management is needed.

Recommendation 2. There is a need for more integrated flood risk management of river basins supported by local capacity building, a clarification of roles and responsibilities, an increased exchange of information and coordination between all sectors and levels of government, and a systematic evaluation and analysis of results by central government authorities.

4.2 3. The budget for structural measures

Notwithstanding an observable increase in recovery expenditures over the last ten years due to the increase of extreme flood events, Japan's severe fiscal crisis in the middle of the 1990's led to a decrease of the central budget for flood protection measures. Such fiscal constraints may prove hard to overcome in a persistently tight national budget context, even though climate change may increase the risks for major flood disasters.

Findings

As a consequence of the limited budget and the growing challenge to flood protection generated by climate change, there is a need to set priorities and to search for new funds. Though initial evaluation including cost benefit analyses is already partly used and communicated to the general public before the initiation of a new project, there is a growing need to implement systematically these types of instruments.

In addition, the need to combine non-structural measures together with structural measures should be defined more clearly when a project is initiated, and integrated into the cost-benefit analysis in order for the appropriate budget to be evaluated and allocated.

Opportunities for Action

The use of cost-benefit or multi-criteria analysis should be used more systematically in the flood risk management decision-making process and communicated to citizens. This will promote the involvement of each individual citizen during the planning of structural and non structural measures as well as general planning and building development projects. Such elements in risk communication can also form a basis for budgetary allocation or decision making at local government level regarding local taxes. The added value of integrating non-structural measures in development projects or flood risk management projects should also be evaluated.

Recommendation 3. Tools such as multi-criteria studies or cost-benefit analyses are needed to promote communication and dialogue in reaching consensus on the acceptable levels of protection and budgets for flood risk management through both structural and non-structural measures and appropriate budget allocations.

4.3 Risk assessment and communication

4.3.1 Data collection and information technologies for early-warning

Responsibility for collecting and monitoring rainfall and water levels falls to the MLIT and the Japan Meteorological Agency (JMA). Flood forecasts are provided to sub-levels of flood disaster management both for the implementation of long-term strategies through flood modelling and for the organization of emergency response through real-time early-warning.

Special attention is already paid to the likely consequences of climate change through scenario building carried out by the Intergovernmental Panel on Climate Change (IPCC).

Findings

Technologies used by the Japanese Government for both collection and communication of weather and flood forecasting are of very high quality and allow for an efficient early-warning system.

A systematic integration of the increased risk of large-scale floods induced by climate change is already underway for policy setting at the protection level, response level and for early-warning. Still, the process is only in its initial phase and should be brought even more into focus.

Opportunities for action

Collaboration between central policy-makers and scientific experts at a national and international level could be strengthened in order to keep updating information technologies and situation awareness systems in respect to large-scale floods, taking account of the increasing risk for major impacts related to climate change.

With regard to communication of information for the purpose of organizing the crisis management system, the opportunity to issue guidelines together with technical data in order

to allow for more holistic and efficient cross sector cooperation amongst the different levels of response at the early-warning stage could be considered.

Recommendation 4. Continued efforts should be made to maintain the very high quality of the information technology research, risk assessment, and communication, including means for early warning, to take into account risks of large scale flooding related to climate change.

4.3.2 Combination of hazard, exposure and vulnerability towards an integrated risk assessment and mapping

Hazard assessment is on the right path and has been implemented through hazard maps by many municipalities. On the other hand, vulnerability assessment has been conducted for medium-size events both by local governments and economic stakeholders including public service network companies.

Findings

At the three levels of public administration, there is a lack of vulnerability assessment, both for damage assessment and safety assessment concerning vulnerable groups. Some private companies have decided to leave flood-prone areas and to move to safer zones, when restructuring their plants.

Opportunities for action

Vulnerability assessment should be carried out by local governments to draw up risk maps which combine hazard and vulnerability assessment. Such risk awareness is a good way to promote vulnerability assessment to individuals and economic stakeholders. The real need is to promote vulnerability assessment at the very local and individual level (to each household, building, company, or any stakeholder installed in flood prone areas), in order to stimulate every decision maker involved to take structural measures to mitigate damage, and initiate non-structural measures such as action plans to reduce damage when large-scale floods occur.

Recommendation 5. Vulnerability assessment needs to be conducted by local government in support of natural hazard evaluation and risk communication with citizens to achieve a more efficient system of flood risk management and damage mitigation through both structural and non-structural measures.

4.4 Flood prevention and damage mitigation

4.4.1 A strong long-term structural flood defence strategy

In view of the country's high exposure to floods, Japan has worked persistently towards the implementation of structural defences. Attention has been paid particularly to the construction of protective engineering works both for river improvements such as dykes, dams and control basins, and for runoff control to counterbalance increased soil proofing with urbanization.

Benefits of these structures have become apparent in many cases and have led to a decrease in damages and recovery costs.

Efforts have been promoted recently by the government to integrate flood prevention works in the social and natural environment.

Findings

Long-term goals set up by the government and more specifically the MLIT aim at a protection against 30 to 200-year floods depending on the size of the river and on the assets at stake.

Currently targets fall short of these goals and are likely to be harder to achieve in view of budget restrictions, further construction in urban flood-prone areas and in the context of climate change, the rising number of extreme flood events that could overwhelm the capacity of existing structures.

Adaptation to severe impacts of climate change indicated by the IPCC 4th report, such as sea level rise and severe heavy rainfall, has led to basic studies and the creation of expert panels. But these findings have not yet been taken into consideration in the current programmes to strengthen structural measures.

Opportunities for Action

Work on structural protection measures needs to be continued both for maintenance and construction in order to approach long-term goals. Meanwhile, priorities need to be established. The integration of physical infrastructures into the landscape and into the social environment needs also to be continued and strengthened.

Non-structural measures should be implemented further to reinforce the efficiency of structural works.

Recommendation 6. The highly vulnerable situation in respect to floods and increasing flood risks, not least due to climate change, requires a much higher level of investments in structural protection measures as well as continued comprehensive integration of physical flood defences into the natural and social environment.

4.4.2 Further development of mitigation measures

Non-structural measures to mitigate flood damages should continue to be sought through the implementation of measures in land use, city planning and building requirements.

The City Planning Law and local master plans require that flood-prone areas should not, in principle, be considered for new urban development.

Regulations on building standards which take into account natural risks are also provided for in the legal framework.

Findings

Local authorities and stakeholders already seem quite concerned with and involved in damage mitigation activities. There are many instances of vulnerability reduction and damage mitigation measures that are undertaken voluntarily.

On the other hand, people living in areas where protective mega-infrastructure (such as dykes, dams, or super levees) are already in place may be inclined toward a sense of safety that does not correspond to the seriousness of the risks. Lack of awareness and advance mitigation measures in these areas, which are perceived as being secure, could be especially problematic in case of large-scale floods. Therefore, risk communication and non structural mitigation measures should be more focused in such areas. Building standards are fully taken into account for earthquakes, and increasingly also for floods as a growing number of districts are declared possible hazard areas.

Opportunities for action

Risk communication and dialogue with citizens should be encouraged to enhance acceptance of land use restrictions and prescription of building standards.

Reduction of vulnerability could be emphasized by avoiding the utilization of flood-prone areas for purposes related to vulnerable population groups, and the facilities they use (hospitals, retirement homes etc...).

There is scope to raise awareness of the need to mitigate damage from possible large-scale floods.

Recommendation 7. There is an urgent need for efficient non-structural measures to combat flood risks through a more holistic approach to prevention and damage mitigation.

4.4.3 The particular flood risks related to hazardous activities

Floods are likely to spread pollutants and harmful substances. Thus, risks emanating from industrial sites need to be considered with special care.

In Japan, just as in other OECD countries, the location and activities of hazardous industries are carefully regulated. Such regulations include mandatory safety measures, security measures and risk assessment considerations, especially for natural disasters such as earthquakes.

Findings

The definition of industrial zones is subject to a detailed legal framework which supports a cross-sectoral approach and encourages urban planning to take economic and environmental considerations into account.

Still, no particular restrictions are directed toward land-owners in areas subject to large-scale floods when protective devices are considered to already secure the area. Further, mitigation measures towards flood risk reduction for hazardous industries are not systematically promoted.

Opportunities for action

Through active communication on the likely costs of a disaster, the government should enhance the good will of industries toward directives to relocate to areas less exposed to floods.

Industries that can trigger special harm in case of flood accidents, such as chemical and nuclear industries, should be required by law to move to safer areas.

In addition, further use of calamity danger districts based on the Building Standards Act to mitigate the impacts of floods could be encouraged.

Recommendation 8. Regulations applicable to hazardous industrial activities should include requirements for operators to assess and manage risks related to floods.

4.5 Emergency response

4.5.1 Coordination during flood events

Emergency response to floods in Japan has to be seen as a part of the Total Disaster Management System, which has been developed through a seamless cycle of prevention, mitigation, preparedness, response, recovery and rehabilitation i.e. protection against floods and river management on the one side and emergency management on the other. The system ensures strong national leadership and multi-sectoral coordination. Operational responsibility for emergency response however falls mainly to municipalities, which are usually the most relevant for undertaking emergency actions. Inter-municipal agreements exist to enhance wider capacity at the local level when needed.

In the event of large-scale floods, the central authorities are responsible for providing situation awareness and decision support. The central government authorities become involved to provide general support and guidance to the local governments, to ensure necessary cooperation and coordination and to provide the additional resources required to manage the disaster. An emergency team at the national government level gathers immediately at the Crisis Management Centre to take stock of and analyze the disaster situation. The Cabinet Office ensures the overall coordination of disaster reduction activities. Meanwhile, the Cabinet Secretariat provides situation awareness and incident information to the Cabinet, based on the data collected 24 hours a day by the Cabinet Information Collection Centre.

The Red Cross deploys its aid force at its discretion or upon request from the prefecture. The MLIT may launch immediate repairs on protective works through the assistance of private companies or volunteers as needed. Critical public infrastructure providers and essential service utilities have undertaken business continuity planning. Response organisations, including volunteer groups, participate in joint exercises or drills on a regular basis.

Strategies are also developed ahead of time to facilitate emergency response, such as issuing guidelines for business continuity planning, or drills and exercises for volunteer citizens.

Findings

The organisation of emergency response in Japan seems to take into consideration the different possible scales of flood disasters and to be well synchronized with other layers of the crisis management cycle which include emergency mitigation and risk assessment.

Local governments are responsible for organizing the emergency response. When the damages caused by floods exceed their response capacities, the central government will supply additional support.

In the event of large scale disasters, the Cabinet Office and Cabinet Secretariat are merged into a united body to ensure a higher efficiency.

The shifting of the organizational structure with the size of the disaster event is consistent with the limited local capacities and the need for a broader approach for large-scale floods. On the other hand, it requires a very high level of advance preparation and a clear definition of how the various administrations will interact together to ensure that the shifting between the organizational structures will not provoke confusion. Though the general division of roles and responsibilities defined in the Disaster Countermeasures Basic Act can be considered relevant, clarifications on the legal provisions for interactions between the different levels

involved in emergency response is needed. More specifically, the leadership of the national government needs to be made more visible both for local decision makers and for the general public.

The chain of command and the interfaces between the national government level and the local governments thus need to be made clearer to all involved in the crises management system, not least the personnel involved at the local government level. The personnel in the different bodies demonstrated during the interviews a strong commitment to their tasks and an excellent capability in their own area of responsibility. Nevertheless, some administrative bodies appeared to be insufficiently concerned by or involved in other authorities' responsibilities within the Total Disaster Risk Management System in general.

Opportunities for Action

Especially in the event of large scale floods, the chain of command and the interfaces between the national government bodies and the local governments need to be clarified. The tools for providing coordination and support to the local governments to increase their capacities could be bolstered and made more transparent.

To reinforce the coordination and consistency of the national leadership in crises, there is also a need for strong preparedness through planning and joint exercises. Crisis communication with citizens and local actors should be enhanced.

A more coherent and transparent system is needed in respect of cooperation, as well as roles and responsibilities of various authorities in the event of a crisis.

Further development of training citizens and volunteers could be strengthened by drills and other educational programs in addition to dissemination of information.

Agreements on flood fighting activities could be promoted more systematically between municipalities.

Recommendation 9. The emergency chain of command needs to be streamlined, and the roles and responsibilities of organizations involved in emergency response at various levels to be clarified and made transparent.

4.5.2 Sheltering and evacuation for large-scale floods

In the event of a flood, information is communicated to citizens on how to evacuate and where to find shelter through the diffusion of hazard maps for each municipality and the use of real-time information techniques at the early warning stage.

Findings

In efforts to organize evacuations, local relief actors use hazard maps to identify water levels, zones of high exposure and vulnerability, and shelters. Flood brigades at the prefectural level and municipal fire and rescue services are involved in the coordination of evacuation operations. Cooperation between these entities is not fully achieved and knowledge is usually limited to each competent authority's specific role without an overview of the Total Disaster Management System.

Though emergency response exercises are conducted in advance to raise citizen awareness and their ability to undertake individual evacuation in case of floods, the involvement of citizens is not complete, especially in areas where floods have not been experienced for many years.

Another challenge is linked to large-scale evacuations for which it is difficult to provide appropriate training and preparation.

Opportunities for action

For large-scale evacuations that are likely to involve the deployment of numerous emergency response forces and require coordinated action between various administrative bodies and levels of government, there is a need for a stronger cooperation between municipalities and prefectures through the definition of appropriate legal procedures and agreements.

Awareness of local stakeholders with regard to the methods of individual evacuation should also be raised more systematically.

Recommendation 10. There is an urgent need to make adequate provision for sheltering and evacuation of local populations that could be affected by large-scale flood events, including through enhanced cooperation between local governments.

4.5.3 Emergency response regarding the most vulnerable groups of population

Physical, economic and cultural vulnerability may impact on people's ability to react to disasters such as floods.

In addition to increased urbanization in flood-prone areas, social factors such as ageing of the population and an increasing number of dependent people, change the conditions of emergency response.

Findings

The Flood Fighting Act was amended in 2005 to take more specific account of vulnerable population groups in emergency situations, including during flood events. The new law requires municipalities to confirm information regarding vulnerable people's facilities, such as nursing homes for elderly people, and to set up local disaster prevention plans to provide disaster information.

Maps have been established at the municipal level in order to identify vulnerable people such as the handicapped, the sick, invalids or the elderly and to allow them to be integrated into rescue plans instead of relying only on mutual help. The efficiency and comprehensiveness of these maps, however, may be limited due to the reluctance of some people to communicate their weakness.

Opportunities for Action

Cooperation between municipal welfare services and risk management authorities should be enhanced to better consider the needs of vulnerable groups at the response stage.

Recommendation 11. Municipal services in charge of disaster response and health and welfare need to be better prepared to reach out to the most vulnerable groups of the population.

4.6 Recovery

4.6.1 The implementation of optimal reconstruction schemes

With the enactment of the Act on Support for Livelihood Recovery and Disaster Victims in 1998, and the issuing of Business Continuity Guidelines, the Central Government of Japan

has already made an important step towards the definition and implementation of national strategies for recovery measures.

Finding

Current policies do not devote attention to the question of preparedness and need for general guidelines for reconstruction. The complexity of dealing with reconstruction after a natural disaster usually makes it difficult to find an appropriate balance between early reconstruction measures, such as building temporary housing or shelters, and long-term recovery of society as well as undertaking measures to evaluate experiences and learn lessons from the crisis or disaster management. There is a need for better preparedness for speeding up the more general reconstruction and of an appropriate use of the experiences of civil protection personnel to integrate preventative or mitigation measures against floods in the planning and building in reconstruction zones and general development of society.

Opportunities for action

It would be of great use to consider the practical experience of civil protection services regarding successful or inappropriate preventative and mitigation measures for emergency response and standards before reconstruction plans are undertaken in city planning and building standards and general development.

Integrating recovery model plans with city plans before the occurrence of disasters could provide a basis for better-prepared, faster and more far-sighted reconstruction.

Recommendation 12. In order to facilitate reconstruction, agreements need to be reached in advance. After the disaster, the detailed organization of reconstruction should be discussed between civil protection and planning services.

4.6.2 The collection and communication of experiences

Strategies to counteract floods, mitigate damages and organize protection and relief actions have continuously been updated in Japan based on past disasters. Information sharing events have been organized in order to collect lessons learned both at the central and local levels.

Findings

The follow-up of past major disasters and the consequent updating of the legislation have proven very successful in Japan. However, there is a need for a more systematic collection of data and experience, evaluation of experiences from the natural disasters that occur quite frequently in Japan, and a strengthened communication with citizens to enhance the general and individual risk culture. In order to facilitate the understanding of roles and responsibilities and to improve disaster risk management there is a need to review the successively developed legislation and thereby make it more transparent and accessible for citizens.

Opportunities for action

A systematic framework for the collection, analysis and communication of past experiences from floods disasters and lessons learned needs to be introduced and implemented in order to keep on improving existing policies, including risk communication with the public and all other stakeholders. There is also a clear need for reviewing the dispersed legislation related to flood risk management to enhance its transparency and to facilitate the understanding and implementation of the legislation by the competent authorities and decision makers at local government level.

Recommendation 13. Risk management experiences should be systematically collected, evaluated and disseminated widely to all stakeholders to enhance the development of an overall risk culture. In addition, an overall review of successively developed legislation should be conducted to improve transparency.

4.6.3 The recovery costs and insurance

Recovery costs are borne by municipalities and prefectures for the most part, although such costs may also be borne by the central government when the extent of damages exceeds local financial resources. An important part of recovery costs are borne by individuals, which highlights the need for an efficient insurance scheme. Floods are usually covered by householders' comprehensive insurance policies.

Findings

Transfers of public funds to flood victims are relatively small in Japan. Indeed, there is no flood reinsurance scheme in which the Japanese government is involved. The Japanese government does not act as a re-insurer, in contrast to many other OECD countries.

Currently, insurance against floods in Japan is handled by the private sector, and is determined by supply and demand. Thus, while in Japan fire insurance is wide-spread, insurance coverage against floods is not considered necessary for areas with low flood risks or for by residents in high-rise apartments. For this reason, the penetration rate of householders' comprehensive insurance remains only around 70% according to estimates by a major Japanese insurance company.

With the recovery costs for losses from floods anticipated to rise due to climate change and further concentration of economic assets in flood-prone areas, the capacity of private insurance companies is expected to be insufficient and this may have a negative impact on financial markets.

Moreover, as Japanese cities go vertical and underground malls develop, accumulated risks increase.

Following the liberalization of insurance premiums, private insurance companies are responding to requests from clients to extend coverage of flood risks. There is concern that risks will increase due to climate change and to the concentration of assets in urban areas, even in areas which have not been considered risky until now.

Opportunity for actions

Because flood losses can be overwhelming, there is an opportunity for the government to become more active in the insurance and reinsurance schemes.

The current Japanese insurance system, which accepts flood risks by depending on foreign private reinsurance markets, is not well prepared for large-scale floods, and the government needs to become more involved through reinsurance or other tools.

Recommendation 14. In order to help citizens and private companies cope with the financial costs of major events, the insurance system regarding floods should be improved, with the aim to increase both the population coverage and the capacity of insurance companies. This could be achieved through a stronger involvement of the national government as reinsurer.

5. Conclusion

Though Japan is one of the most advanced country in the world in respect to flood management, there is still a scope for improvement especially considering the upcoming of new challenges such as allocation of financial resources in a time of budget restrictions and consequences of climate change.

Allocating resources optimally amongst competing social and infrastructure needs, against a background of fiscal consolidation and mounting pressure to reduce public investment expenditures, is not easy. Nonetheless the case can be made to maintain, re-allocate and even increase in some situations the resources to cope with natural disasters in Japan. Indeed, in the light of the prospect of significant increases in the cost of recovery from major disasters, efforts to enhance prevention and mitigation and to improve non-structural measures do need to be stepped up.

Such efforts would include:

- ✦ A better anticipation of the potential negative consequences stemming from climate change with respect to the frequency and scale of damages in case of natural disasters, particularly in the case of floods, typhoons, windstorms, tsunamis, even if the population of Japan is due to decline in the decades to come.
- ✦ Better integration of risk management policies regarding emerging risks, as well as consideration of worst-case hypotheses – for example, what would happen if a severe earthquake was to trigger a large-scale flood or in the case of a co-occurrence of a large-scale flood and a serious epidemic?
- ✦ Sustaining investment and maintenance via structural measures such as dykes, levees, locks or other protective measures needs to remain a high priority. But at the same time non-structural measures such as the clarification of roles and responsibilities, capacity building at local level, evacuation procedures, consultations with stakeholders, use of building codes, etc. should receive both more attention and in some cases more resources.

In the context of the current budgetary constraints in Japan, a number of options remain open:

- ✦ Consider ways in which the excellent horizontal approaches already in place for floods, in the form of such mechanisms as the Disaster Management Council, Technical Investigation Committees, etc., might be applied to other risk areas (pandemics, terrorism, technological accidents, certain financial or social risks).
- ✦ Reinforce the roles of Cabinet Office and Cabinet Secretariat in monitoring the threats and coordinating policy measures across risk areas.
- ✦ Use the opportunity presented by large investment needs in tangible infrastructure (water, transportation, gas distribution, power generation and transmission, telecommunications) to enhance long-term measures for disaster risk management, in light of the challenges stemming from new risks; such measures might include a more proactive approach to land use and city planning on the basis of existing risks and vulnerabilities, better adaptation of infrastructures to vulnerable groups, a more energetic search for cost efficiency and greater resilience of systems.

Bibliography

- Agence Japonaise de météorologie. (2004). *Climate Change Monitoring Report 2003*. Tokyo.
- Andrew P. Bradbury. (2007). *Application of a large-scale, long term, regional coastal observation network to coastal management on the English-channel coast*. Channel Coastal Observatory.
- Baden-Württemberg Umweltministerium. (2007). *Hochwasservorsorge in Baden-Württemberg: Anforderungen an Anlagen zum Umgang mit wassergefährdenden Stoffen* [Ministère de l'Environnement d'Allemagne. (2007). *Protection contre les inondations à Baden-Württemberg: Recommandations sur les installations de stockage et de traitement des eaux contaminées.*].
- Commission Européenne. (2007). *Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (Text with EEA relevance)*.
- Conseil Exécutif, Gouvernement du Japon (2007). *Disaster Management in Japan*. DHI Eau & Environnement. (2006). *Gestion du risque inondation basée sur la méthode inondabilité* ». 7^{ème} Conférence Internationale sur l'Hydroinformatique, HIC 2006, Nice. France.
- EPTB Loire et SEPIA Conseils. (2007). *Apprendre à vivre avec les inondations. Les EPTB, un moteur d'innovation*. France.
- Gouvernement du Japon. (2007). *The City Planning Law (Law n°100 of June 15, 1968). Final Revision: Law n°61 of June 8, 2006*. Japon.
- Institut Japonais pour le développement des infrastructures. (2007). *The review of process of Floods and Earthquakes in Japan*. Présentation Power Point à la 7^{ème} réunion du groupe de travail de l'OCDE. Non publiée. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. Bureau des Rivières. (1999). *The river law with commentary by article, Legal Framework for River and Water Management in Japan*. IDI Water Series No 4. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. Bureau du développement régional de Kanto. Comité de Bassin de la rivière Tsurimi. (2004). *Life and Livelihood bound to the Earth : a vision for the regeneration of the Tsurimi River Basin*. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. (2006). *Flood Fighting in Japan*. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. Bureau de la rivière Arakawa – Karyu. (2006). *L'Arakawa: rivière urbaine. Guide de présentation de l'Arakawa aval*. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. (2006). *Rivers in Japan*. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. (2007). *Existing Conditions and Tasks of River Administration in terms of Flood Control*. Présentation Power Point. Non publiée. Japon.

- Ministère du Territoire, des Infrastructures et des Transports du Japon. (2007). *River Administration in Japan*. Présentation Power Point. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. Division de la gestion des rivières. (2007). *The Review of Floods in Japan*. Présentation Power Point à la 7^{ème} réunion du groupe de travail de l'OCDE. Non publiée. Japon.
- Ministère du Territoire, des Infrastructures et des Transports du Japon. Division de la gestion des rivières. (2008). *Adaptation measures related to water-related disasters to reduce the impacts of climate change due to global warming*. Présentation Power Point à la 7^{ème} réunion du groupe de travail de l'OCDE. Non publiée. Japon.
- Paklina N. (2003). *Flood Insurance*. OCDE. France.
- OCDE. (2003). *A Methodological Framework for Evaluating Risk Management Policies, background document for the first meeting of the Project Steering Group*. France.
- OCDE. (2006). *Information security in Norway*. OCDE Risk Management Studies. OCDE. France.
- OCDE. (2007). *Risk Management Policies in Japan concerning large-scale floods*. OCDE Study in Risk Management. OCDE. France.
- OCDE. (2007). *Screening study: ranking Port Cities with high exposure and vulnerability to climate extremes. Interim analysis. Exposure Estimates*. Working Party on Global and Structural Policies. France.
- UN/WWAP (United Nations/World Water Assessment Programme). (2003). *1st UN World Water Development Report: Water for People, Water for Life*. Paris, New York et Oxford.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) and Berghahn Books (2003). *Pilot Case Studies: a focus on real-world examples - Greater Tokyo Japan*.
- Vidal-Naquet P.A. and Calvet F. (2000). *A l'épreuve d'une catastrophe. Les inondations de novembre 1999 dans le midi de la France*. Ministère de l'Aménagement du Territoire et de l'Environnement.