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STOP Disasters

Building a Culture of Prevention

Disaster Reduction in Urban Systems

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Disaster Reduction in Urban Areas: Concepts Made Simple

Disaster reduction is a necessity for urban inhabitants, an obligation for local authorities and a strategic resource for development promoters

B.G. Deshpande

(reduced and edited by the editors)

The world population is growing , quicker in some parts of the world than in others. But there is no doubt that this situation will persist. In cities in particular there is an influx of populations from the surrounding areas, mostly in search of opportunities of work and better living conditions. One person out of a family of 4 or 5 is gainfully employed. The others are a mere addition to the urban population.

All this influx adds to the basic urban problems. Since open spaces in cities are limited, high-rise buildings become a necessity. Thus, shelters for people and structures for markets, schools, hospitals, etc., grow along with the population. The transport system is always strained as more people congregate in the cities.

This causes a tremendous strain in the management of cities. One has to think in terms of natural disasters which still affect almost any part of the world, and which cause tremendous hardships to the society. Each hazard has an impact on the population, both human and animal.

Floods usually follow strong rains and winds, and cause flooding of the rivers, landslides, etc. Cyclones cause similar damages. Tsunamis take coastal populations by surprise and may kill dozens of people in a matter of minutes. The landslides release debris from high altitudes to lower ones, often causing floods, pollution of water sources, etc. Volcanoes are a comparatively rare phenomenon and their locations are generally known.

Last but not least, the earthquakes. These are the most unpredictable natural calamities. They can occur almost anywhere, though they are generally confined to areas known as plate boundaries. However, in this century there has been enough evidence proving that they can materialize almost anywhere, anytime, and of any magnitude, varying from low intensities, which are usually only frightening, to very violent ones, which cause a complete devastation. The time of occurrence is important - if a high-intensity earthquake occurs during the day, when most people are out of their houses, a large segment of the population will not be hurt. But if the same earthquake happens at night, the loss of lives will be greater.

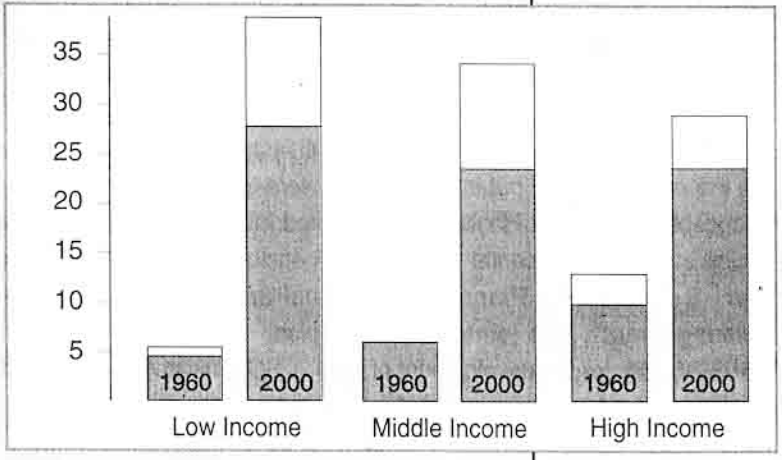
Some disasters, such as floods, cyclones, fires, etc. occur during predictable times. The only disaster the locaton, time, and intensity of which cannot be predicted, is an earthquake. Hence, it calls for a much greater care and caution.

All disasters ultimately result in destruction. And the best thing one can do in this respect is to create awareness, followed by popularization of the known methods of mitigation.

Psychological impacts of disasters are usually very severe. Some people are not able to recover from the shock. Normal urban utilities such as communicaton, electricity, water supply, drainage, etc. are dislocated. The same applies for all means of money earning possibilities for affected populations.

It is logical that bigger cities with a higher standard of living face more risks due to natural disasters. Therefore, unless some precautions are taken beforehand, there is no hope of survival or escape from the consequences of disasters.

URBAN TRENDS
Growth in the number of large cities (3-8 million inhabitants) and megacities (over 8 million inhabitants) in low, medium and high income countries
Source: Megacities: reducing vulnerability to natural disasters. The Institution of Civil Engineers, London, UK, 1995



Urban populations should be advised to insure their properties against natural calamities. Fire-fighting and ambulance services should be ready at all times. Combustible substances in people's houses or public places should be reduced to a minimum, packed properly, watched and protected from fire.

The role of women and children is as cru-

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cial as ever. Once they know what steps should be taken in their own houses and in the community, they diligently implement what they know. Children look after old and handicapped persons. They can also cut off electricity, and make sure that nothing is hanging above the head level.

Obviously, prolonged blackouts can disrupt cities' economic and commercial activities and development.

After the disaster, certain steps should be taken. After removing the casualties, the priority should be restarting the electricity, water and food supply, etc. Most houses are damaged beyond quick repair and thus unsafe to live in.

Therefore, large temporary shelters must be raised. The government and social institutions will plan a large-scale housing and provide for basic necessities.

Disaster prevention, mitigation, preparedness, relief and rehabilitatoin are the main elements of natural disaster reduction. Recognizing the need for these elements, the United Nations is observing the present decade as the International Decade for Natural Disaster Reduction (IDNDR). As more than half of the decade is passed there is a spectacular awakening and implementation of these elements all over the world.

It is hoped that by the end of the century most cities, even those in undeveloped regions will be prepared to face these disasters, thus reducing the deaths and injuries to the minimum. Houses and infrastructure must be constructed with an eye on disasters.

The Sustainable Cities Programme

In recent years the urban environment has become a major source of international concern: cities - which absorb two-thirds of the population growth in the developing countries - make a vital contribution to social and economic development at national and local levels.

However, full realization of cities' potential contribution to development is often hindered by environmental degradation, which obstructs the full utilization of city resource bases and renders cities vulnerable to environmental hazards. The Sustainable Cities Programme (SCP), established in the early 1990s to put into practice concepts of the joint Habitat / UNEP publication "Environmental Guidelines for Settlements Planning and Management", is a joint Habitat / UNEP facility for the development of a sustainable urban environment, founded on public participation. A fundamental concept underlying the SCP's activities is that we must look within the cities themselves if we are to achieve lasting urban sustainability.

Disaster situations in urban areas are a symptom of inadequate planning and management. Proper management of the urban environment includes management of natural resources and environmental hazards, which, in turn, reduces the likelihood of urban disasters.(1)

The SCP strengthens capacities in urban management and planning at the local level; a community sensitized to SCP's concepts is a community aware of the effects and consequences of its actions in the urban environment.

The Awareness and Preparedness for Industrial Emergencies at the Local Level (APELL) workshop, held in Concepción, Chile in April 1995 as part of SCP activities, is an example of community preparedness for urban disaster. The goals of the workshop were to pinpoint issues to be considered in a plan for technological emergencies and the necessary institutional arrangements to carry out the plan.

SCP initiatives in other cities have addressed issues such as treatment of solid waste, establishment of storm water drains, management of hazardous lands, and control of sewage discharge into local rivers. The SCP partner cities are creating urban centers where resources are sustained and renewed, and in which disasters are avoided or dealt with through concerted local effort.

Although each city develops its own response to local needs, all demonstrations are designed to generate certain outputs:

- A strategic development plan which includes key components of environmental planning and management strategies, sector-investment strategies, financial planning and administrative / legal requirements;
- Technical assistance projects and bankable investment packages based on priority actions identified in the strategic development plan;
- A capacity-building program to strengthen the skill and institutional arrangements needed for Environmental Planning and Management;
- A review mechanism for evaluating the success of the program, and for sharing experiences with other SCP cities.

(1) Environmental Guidelines for Settlements Planning and Management, Vol III (UNCHS-Habitat / UNEP, 1987)

For further information on SCP contact: Jochen Eigen, SCP, UNCHS (Habitat), Nairobi, Kenya. Tel. 254 (2) 623226. Fax 254 (2) 624264. E-mail:jochen.eigen@unep.no

ViSP - A New Methodology in Urban Planning

Jukka Nieminen

(reduced and edited by the editors)

UNCHS (Habitat) has, in cooperation with the Technical Research Centre of Finland (VTT), developed a new approach for urban planners called "Visual Settlement Planning (ViSP). The word, which originated as an urban planning exercise, also serves new areas closely related to urban planning, such as disaster management.

The VTT has developed a computerized approach to land-use planning, incorporating statistical and graphic data into a portable format using a micro-computer workstation which includes a high-resolution screen, optical memory drive, multi-color scanner, slide scanner, and multi-color printer / plotter.

UNCHS (Habitat) has helped in building the user interface for the developing countries, making it possible for planners to operate the system with a minimum of training.

The ViSP approach, using off-the-shelf hardware and software, can use satellite images, aerial photographs, normal slides and photographs, and video images as input, thus revolutionizing aerial photo, video image or satellite image. Explanatory text can be shown on the images. Close-ups can also be imaged, or maps brought in from AUTOCAD or MIPS to overlay the video image. Using a paintbrush like facility the picture can be retouched, for example by pointing out buildings which would easily collapse in an earthquake.

Global Positioning Systems (GPS) can be linked to ViSP to get accurate location of buildings, bridges and other landmarks. This frees the user from the problem of not being able to link the images and photos to the coordinate system. Geometrical image rectification can be done before the digitizing work from full-color images is started. Photomosaics can be created as long as there is a sufficient overlap on pictures.

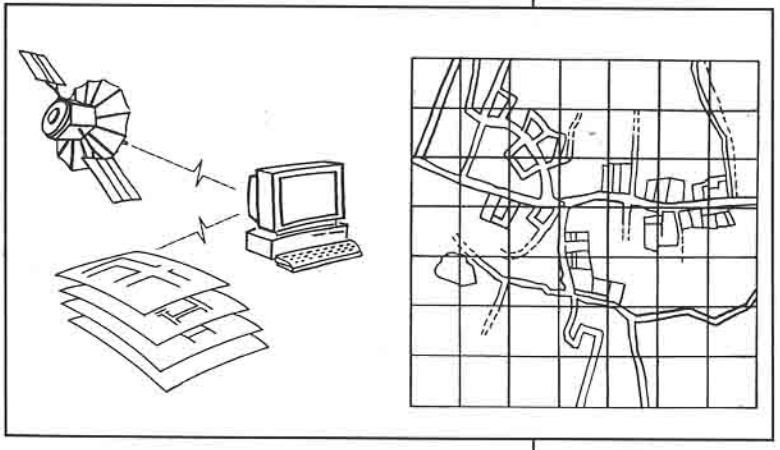
The material generated can be viewed on the computer screen, through a video projector, a standard multi-system TV set, or printed out to show other planners, decision-making bodies, and the community. The possibility for increased community participation, public awareness and the constant minitoring of, e.g. squatter settlement buildup is obvious.

The ViSP approach can be used in projects dealing with urban management, physical planning, squatter settlement upgrading, geographical information systems (GIS), and disasters.

ViSP as a tool for monitoring

ViSP can be used effectively in getting reliable material for analysis of changes in squatter areas or fast developing urban areas. A camera can fly over the target area and take aerial photos or videos. This material is processed and quick maps and full color images are printed. These areas can be re-surveyed periodically. By comparing the pictures from different times it is possible to get accurate assessment of the development of the area.

The accuracy of pictures depends on the flight altitude, vegetation canopy, weather conditions, and the photo / video equipment used.



Source: Megacities: reducing vulnerability to natural disasters. The Institution of Civil Engineers, London, UK, 1995

Especially in disaster cases which cannot be predicted with enough time to get pre- and post-disaster pictures, ViSP can be used for fast assessment of damages, analysis, and possible relocation sites for the victims, and fast mapping of the affected area.

The ViSP approach is extremely fast compared with conventional methods of aerial photography or field surveys. It is highly improbable that the disaster area has fresh aerial photos or maps available. It is also unlikely that national mapping authorities could mobilize full photography over the area

How ViSP can be utilized in public-awareness campaigns

A typical ViSP project has the following major steps:

- Collection of existing map material of the target area;
- Preparations to take aerial videos, photos of the area;
- Flight over the area;
- Processing of the material acquired from flights;
- Capture of video images, slides and aerial photos into the computer;
- Geo-referencing of captured material (also use of GPS);
- Geometrical correction of images, when applicable;
- Building of photo mosaics;
- Print-outs and "raw maps" for survey teams;
- Attribute data collection in the field;
- Preparation of GIS map base from picture / image material;
- Linking collected attribute data to GIS map-base;
- Statistical analysis, preparation of thematic maps;
- Visualization of picture material (add texts, symbols);
- Preparation of plans, improvement options, etc;
- Awareness campaigns using processed picture and image material;
- Implementaton and follow-up.

within a short warning time. In these cases low altitutde (500m - 1000m) video or photography using a normal 35mm camera can give fast material for disaster relief operations. Video images are ready for use practically immediately upon landing. Photos and slides cover a larger area in each picture, but take a longer time to develop. Even so, the time required is a couple of hours (videos) to a couple of days (slides).

ViSP can be used for fast mapping in areas which do not have updated maps available. It should be noted, however, that fast maps are not as accurate as maps prepared by national mapping agencies.

ViSP maps can be made directly from aerial video images. The image is captured ("grabbed") in the computer immediately after the flight lands. In a couple of hours, the first "map sheets" are digitized and plotted for the survey team. The survey team can also use print-outs of the full-color images if there is no time to wait for the map to be ready. It takes about 10 minutes to print one full-color image after it is "grabbed."

If a Global Positioning System (GPS) device is available, it is possible to get sub-meter coordinate accuracy after the differential calculations of the defined control points are ready. Measurement of each control point takes approximately 10 to 20 minutes. Once this is done all video images or aerial photos and slides can be geometrically corrected. Photomosaics can be produced from the rectified images.

The digitizing work continues when the survey team is in the field. The digitized map will be converted into GIS map base, e.g., through DXF-conversion. The DXF-file can then be imported into most commercial GIS and desk-top mapping packages.

When the survey team returns from the field, its material will be entered into normal dBASE, ORACLE, or other database files. They will then be linked to the GIS map base for the production of the first thematic maps of the planning area.

In cases where recent maps do exist, the geometrical correction of captured images can be done using the coordinates retrieved from the original map. After the correction procedure the full-color image can be "rubber sheeted" on top of the map.

The extent of change compared to the time of the "original map" can then be immediately assessed. If there are numeric maps over the area, quick production of updated base maps is possible.

Hardware requirements:

- IBM compatible microcomputer (personal computer) with minimum 486DX2/66 CPU, at least 600 MB HDD, at least 8 MB RAM, 1.44 MB floppy drive, DOS 6.0, Mouse;
- Windows accelerator, VLB with 2 MB video RAM;
- Optical disk drive, if hard disk capacity is small;
- 17" Multisync monitor or similar with analog RGB connectors;
- CD ROM drive, double speed, multisession, XA;
- Tape drive for back-ups;
- Color printer (A4/A3 size, at least 300 dpi);
- Color scanner, flat bed (A3 size, at least 300 dpi);
- Slide scanner (2600 dpi);
- A1 or A0-size digitizing table;
- A1 or A0-size pen plotter (8 pens).

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Disaster Mitigation through Appropriate Plans and Codes

Case-Histories from the Caribbean and Latin America

Caribbean countries, small islands and continental states, are subject to the regular occurrence of natural disasters: hurricanes, earthquakes, and in certain countries volcanic eruptions.

Rapid economic and social development in most of the Caribbean countries has been accompanied by a growing stock of housing and infrastructure services, as well as by a host of installations and facilities necessary to support economic activities, mainly in tourism.

This has contributed to the increased exposure of Caribbean settlements to the effects of natural hazards. Housing, infrastructure, and other installations are often not located, designed, or constructed taking into account principles for the mitigation of the effects of such hazards.

The resulting dire economic losses and the impact on the poor are forcing several countries to postpone development goals and redirect investment priorities to reconstruction and rehabilitation.

The governments of the region have recognized the need to mitigate the damage caused by these natural events through preventive strategies. They are aware that emphasis should be given to the development of standards and planning regulations to ensure that buildings, infrastructure and other installations are constructed in a safe manner and resistant to natural hazards.

The Caribbean Community Secretariat (CARICOM), the Organization of Eastern Caribbean States (OECS), the United Nations Development Programme (UNDP) and UNCHS (Habitat), through the project called "Human Settlements Development and Related Environmental Management," are providing support to countries of the region in formulating building codes and guidelines that incorporate disaster mitigation criteria. The Caribbean Uniform Building Code (CUBiC) has already been prepared. The project supports countries of the region in adjusting the CUBiC to the specific institutional and legal requirements of each country.

The project recognizes that a large amount of housing and infrastructure cannot meet the standards set out in improved planning and building codes. It is also realized that higher codes have an impact on housing and infrastructure costs that cannot be met by large sectors of the population. Thus, efforts have been made to build the capacity of local technicians and community members in low-cost improvements that can upgrade existing housing to minimum acceptable standards. Incremental improvements and better capacity by small contractors are seen as key elements of this strategy.

These measures are accompanied by actions to develop the capacity of the local planning departments and building inspectorates to ensure that minimum standards are maintained, and to assist communities in understanding and applying the requirements of the codes.

There are many technical tools and strategies to prevent disasters and mitigate their effects. However, such tools are only effective if they can be applied taking into account the economic and social conditions of the local communities. By employing an integrated approach in the formulation and application of disaster mitigation plans and codes, the project aims at having an instrument that promotes safe settlements and sustainable economic and social development.

Jorge Gavidia

(reduced and edited by the editors)

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Some Regional Organizations active in disaster management activities:

Organization of Eastern Caribbean States (OECS)
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St. Lucia
Tel. (1-809) 452 1847 / 453 6208
Fax (1-809) 452 2194

Caribbean Community Secretariat (CARICOM)
P.O. Box 10827
Georgetown, Guyana
Tel. (592-2) 69280-9 / 52961-5
Fax (592-2) 67816 / 57341

Caribbean Disaster Emergency Response Agency
The Garrison, Saint Michael, Barbados
Tel. (1-809) 436 9651
Fax (1-809) 437 7649

Training Policies and Civil Protection in Italy

Antonio Triglia

Within the Civil Protection sector, FORMEZ [1] pursues two training objectives:

- dissemination of a Civil Protection culture, aimed mostly at local communities;
- planning and implementation of a variety of specific training activities, including professional update and specialization.

As a result of the considerable impact of the 1980 earthqhuake in Campania and Basilicate regions, a first program addressing disaster management and prevention needs was developed, based on three premises:

1. Civil engineers were offered the know-how required for assessing the damages to buildings, in order to check the existence of safety requirements (1981).
2. Local administrators and technical staff were assisted in gaining the qualificatons needed for the rehabilitation programs of the stricken areas, supported with the financial aid from the government (1981-82).
3. The historical memory of stricken communities was preserved through protection of the cultural heritage in libraries, archives and documentation (1981-82).

Subsequently to these three programs, FORMEZ activities in this field were developed within a systematic approach.

In the provinces of Benevento (1989), Potenza and Matera (1994-95), pilot programs based on courses and workshops were aimed at local administration's technical staff, teachers, professional staff and volunteers, reaching 700 people for a total of over 5.500 persons / days of training.

The merit of the above initiatives lies in undertaking a joint effort with local administrations and institutions, comprising a work methodology and a forward-looking customer relationship. The good understanding reached with the officials responsible for central government functions in each province, as well as with local institutions, is the basis of positive results of the training programs. At the same time, the close cooperation with the Civil Protection Coordination Department of the Presidency of the Council of Ministers and the Firefighting Directorate of the Ministry of Interior lead to a high-quality professional approach.

As a whole, activities carried out at Benevento, Potenza and Matera aimed at the creation of a Civil Protection culture in society and at the progressive development of a new professional function - the Disaster Manager. This is the result of longterm training courses focusing on the formulation and implementation of civil protection plans at various levels.

The Under-Secretary of State for Civil Protection, in his address to the concluding session of the Matera training program, stressed the importance of specialized training as a key factor for the development of civil protection.

Later on, the cooperation with the Civil Protection Department led to preparations for the "Forest Fires Campaign 1994." A large program of workshops and training classes gathered administrators and technicians of local institutions, mostly from local communities, i.e., those who are on the front line of the battle against fires.

The program (1993-94), aimed at the updating technological tools available for forecasting, prevention and response management for forest fires, and at creation of the required level of homogeneous behavior and communication language among operators belonging to different entities, through the development of a common professional culture. The dimension of the program, attended by 280 mayors and technicians for a total of 1800 training days, is a significant indication of the interest shown for this field.

The most recent concern of FORMEZ is the ad-hoc Program for the Forest Crops of the Sicily Region, an autonomous body. Curriculum planning and administraton were entrusted to the Institute by the regional government.

The FORMEZ program fits well within an overall environmental balance concept, based on the assessment of various options in respect of natural hazards and related risks. The notion of "cost" is thus quantified taking into account broader factors. This underlying concept comprises:

[1] FORMEZ (Institute for Studies and Training) is the Italian training institution charged with the mission of responding to the needs of Italy's regional and local administration

- investments in prevention in order to generate "savings" at a later stage;
- educating operators and political decision-makers to coexist with natural hazards;
- knowledge of the specific threats caused by forest fires, including causes as well as social and economic aspects;
- disseminating knowledge of methodologies and know-how for fire-fighting, aiming at the active preservation of environmental values and human settlements.

FORMEZ is open to international cooperation and agreements have been reached with the Open Partial Agreement of the Council of Europe and with IDNDR. Training programs have been coordinated with those of the Higher School for Public Administration, which addresses the needs of government staff.

For further information, contact Dr. Antonio Triglia, FORMEZ, via Rubicone, 11 00199 Roma, Italy. Fax 06 8489-2252.

DISASTER REDUCTION ACTIVITIES IN THE WORLD:

"Illustrative examples reflecting the major goals of the Decade"

Between 1990 and 1994 the Scientific and Technical Committee of IDNDR (STC) has endorsed forty three projects as illustrative examples reflecting the major goals of the Decade. These projects, which are in various stages of development, also demonstrate the specific targets for achieving these goals. Further elaboration, especially during the World Conference on Natural Disaster Reduction in Yokohama in May 1994, has changed the focus and emphasis in certain sectors, building on what the STC had developed.

Stop Disasters will in future, under the heading Disaster Reduction Activities in the World, publish some of these illustrative examples. For those who wish to submit their projects, programs, training initiatives, studies, and manuals for possible inclusion in the IDNDR Compendium of Current Knowledge in the Field of Disaster Reduction these goals, targets and recent policy adjustments should be carefully considered.

For further details on "Goals and Targets"; "Specific Targets" and "Policy Adjustments of the IDNDR since the World Conference" please, see Stop Disasters N° 27, page 21.

Ernst A. Lohman
IDNDR Secretariat;
Research, Analisys and Application Division

Some Conclusions from Previous Reviews of Disaster Reduction Projects

- **Hazard/Vulnerability/Risk-Process.** The process of translating hazard assessment into vulnerability and risk assessments as a basis for disaster reduction programmes, especially at the local (micro) level is in most projects only marginally addressed.
- **Composite Risks.** The approach by type of disaster precludes the notion of composite risks. Good projects in composite risk analysis and mapping, such as those carried out in the seventies in Asia and Latin America should be encouraged.
- **Integration.** The process, and methodology, of integrating disaster reduction into sustainable development planning is insufficiently addressed.
- **Communication.** The process and methodology to communicate the results and products, (i.e. hazard assessments) of disaster reduction programmes to the users (planners, policy and decision makers) and the end-beneficiaries (affected communities) is insufficiently addressed.
- **Costs.** The socio-economic (cost-effectiveness) as well as the legal aspects are "undernourished" fields in many disaster reduction projects.
- **Applicability.** Many programmes, presented as disaster reduction projects are focused on academic research, without answering the question how the results will be applied in the field. Without challenging the need for basic academic research, it is the prime task of the Decade to demonstrate the practical application of research results at the national, local and especially project/community level.
- **Local Emphasis.** Too many programmes, presented as disaster reduction projects are focused on global and regional aspects, whereas in the IDNDR Yokohama Strategy emphasis is given to national and local disaster reduction programmes, including the role of the community in the planning, implementation and maintenance of disaster reduction works.
- **Geographic Spread.** More projects need to be encouraged and supported that originate from Africa, CIS and Middle East, and that have been prepared by African, CIS and Middle East expert institutions. These projects should demonstrate the regional "culture" for developing disaster reduction policies and practice.
- **Originality.** Some disaster reduction projects, presented as new, original thinking, should make better references to similar projects and publications in the past. They are in fact repetitions of earlier projects and publications in the same fields.

See pages 22-23 for Project Description