DISASTER MANAGEMENT

MISSION TO

DEMOCRATIC PEOPLE’S
REPUBLIC OF KOREA

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<tr>
<td>AC</td>
<td>Agriculture Commission</td>
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<td>ACF</td>
<td>Action Contre la Faim</td>
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<td>ADNEWS</td>
<td>All Disaster National Early Warning System</td>
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<td>AREP</td>
<td>Agricultural and Environment Protection</td>
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<td>DG VIII</td>
<td>Directorate General 8 of the European Commission</td>
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<td>DIPECHO</td>
<td>Disaster Preparedness of ECHO</td>
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<td>DPIM</td>
<td>Disaster Preparedness and Impact Mitigation</td>
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<td>DPRK</td>
<td>Democratic People's Republic of Korea</td>
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<td>ECHO</td>
<td>European Commission Humanitarian Office</td>
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<td>ESAF</td>
<td>FAO Food Security Division</td>
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<td>ESCAP</td>
<td>Economic and Social Commission for Asia and Pacific</td>
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<td>EU</td>
<td>European Commission</td>
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<td>EWS</td>
<td>Early Warning System</td>
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<td>FAO</td>
<td>Food and Agriculture Organisation</td>
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<td>FDRC</td>
<td>Flood Damage and Rehabilitation Commission</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GDV</td>
<td>Grid of Differentiated Vulnerabilities</td>
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<td>Ha</td>
<td>Hectare</td>
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<tr>
<td>HaVRA</td>
<td>Hazard, Vulnerability and Risk Analysis</td>
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<tr>
<td>IFRC</td>
<td>International Federation of the Red Cross and Red Crescent Societies</td>
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<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
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<tr>
<td>MT</td>
<td>Metric Ton</td>
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<td>NDMC</td>
<td>National Disaster Management Commission</td>
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<td>NS</td>
<td>National Society of the Red Cross</td>
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<td>OCHA</td>
<td>Office of the Coordinator for Humanitarian Affairs</td>
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<td>OPEC</td>
<td>Organisation for Petroleum Exporting Countries</td>
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<td>PRRO</td>
<td>Protracted Relief and Recovery Operation</td>
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<td>PVO</td>
<td>Private Voluntary Agency</td>
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<td>SDR</td>
<td>Swiss Disaster Relief</td>
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<td>SIDA</td>
<td>Swedish International Development Agency</td>
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<tr>
<td>TCOR</td>
<td>Technical Cooperation Relief (the emergency branch of FAO)</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNDMTP</td>
<td>United Nations Disaster Management Programme</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>UNICEF</td>
<td>United Nations Children Fund</td>
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<tr>
<td>USS</td>
<td>United States dollars</td>
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<td>WFP</td>
<td>World Food Programme</td>
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ACKNOLEDGMENT

This mission in a very fascinating country could not have taken place the effective way it did without the excellent support from the Flood Damage and Rehabilitation Commission (FDRC) at both central and decentralised levels (provinces and counties -ry). The technical exchanges with the colleagues from the DPRK Ministry of Agriculture (MOA) and the Ministry of Land and Environment Protection (MOLEP) provided a useful technical framework. The debate on the Draft of the document left with FDRC a couple of days prior to departure from Pyong Yang showed that, although many of these ideas still require more analysis by the DPRK Authorities, there is a strong interest in the whole idea of integrated disaster management.

As an inter-agency mission, this exercise had to draw upon the resources of both WFP and FAO teams in DPRK. The constant support from the UN Humanitarian Coordinator David Morton, from the DPRK WFP office, from its country director down to technical and programme support colleagues, both international and national, made the mission relatively easy. The back-up from the small FAO office was also highly appreciated in order to learn in a short time as much as possible about a complex agricultural system and its evolutions and trends.

NGO colleagues have also shared their experience, spared their time without counting. They should be thanked each and all.

Early preparation steps and contacts in Rome by both FAO and WFP have also been of a great help. Post-mission feed-back from FAO technical divisions during the debriefing session upon return proved to be extremely useful. Colleagues involved in these phases at both FAO and WFP Headquarters shall find here extensive thanks.

Special thanks for the national colleagues from the DPRK WFP and FAO offices. Sometimes as translators, but more often as “cultural bridges”, they have been extremely efficient, kind and useful.
1. EXECUTIVE SUMMARY

1.1. DPRK AND THE 1999 WFP/FAO JOINT MISSION IN BRIEF

DPRK is a mainly mountainous and hilly country where arable land represents only about 15% of the total surface. It has one of the lowest ratio “arable land/industrial worker” on Earth. After years of relatively high growth in its economic and human development indicators, DPRK has been badly hit by the termination of its special economic ties with former Soviet Union and most of the former “Eastern Block”. Major markets for DPRK exports and critical supply sources were lost, including those permitting the country to import a series of essential goods: raw material to prepare mineral fertiliser and oil for the industrial and agricultural machinery. In addition, the country entered in 1995 in a spiral of increased food insecurity catalysed by recurring natural disasters: floods, drought, hailstorm, tidal waves. The international community started in 1995 large scale relief and recovery programmes, including large scale food assistance and emergency agriculture activities, including the design of the AREP programme which plays the role of a broad framework for coordination.

1.2. DISASTER PREPAREDNESS AND IMPACT MITIGATION (DPIM)

In a disaster prone country, disaster prevention and activities related to disaster management are of crucial importance. Various strategic levels have been analysed and discussed during this mission. This resulted into the 5 following points:

- The implementation of a Hazards, Vulnerability and Risk Analysis (HaVRA) in order to understand the patterns of disasters in DPRK. It resulted into both an better understanding of the various factors affecting the nature, the scope, the magnitude and the frequency of the different types of disasters which have or could again strike in DPRK, as well as of the socio-economic parameters of vulnerability. These two sets of data were crossed into a comprehensive Grid of Differentiated Vulnerabilities (GDV). In the future, this analysis should be deepened with FAO Food security/nutrition units and WFP VAM joining hands in that endeavour.

- The analysis of the current activities implemented by national structures as well as by international agencies showed that this sector area is of concerned for both national and international actors. Forest fire has been also a concerned for the Authorities, which led to the promotion of firebreaks in the forested areas. The need to ensure complementarity between the various actors has to be underlined, including the National Red Cross Society and its supporting International Federation, was underlined. This has to do with Disaster management training (including First Aid Training) and a set of disaster preparedness activities, including stockpiling (food and non food) and establishment of Contingency Plans at both central and decentralised levels. UNDP plans to start in the near future a Geographic Information System (GIS) and FAO could link up with it for technical support to the systematic mapping of disaster affected and disaster prone areas.

- An assessment of the existing national Early Warning System (EWS) and of the sectors which might require support was undertaken. DPRK used to have a relatively well functioning hydro-meteorological data recording network. This system requires technical support as well as the provision of additional equipment. The need links between national and international weather forecast systems as well as between national and international EWS was seen as crucial. FAO technical support in this sector could be useful, would DPRK Authorities request it.

- A suggestion that, in the long run, the quite effective Flood Damage and Rehabilitation Commission (FDRC) be transformed into a National Disaster Management Commission (NDMC). FAO could provide training and opportunities for visit tours in areas confronted with the same types of problems.
1.3. PROTRACTED RELIEF AND RECOVERY OPERATION (PRRO)

WFP has recently designed a new approach for integrating relief food aid during protracted crisis with rehabilitation and activities supporting recovery: the Protracted Relief and Rehabilitation Operation (PRRO). A PRRO in DPRK would offer to WFP the opportunity to expand the scope of its intervention and make them more appropriate to more directly addresses causes of food insecurity and disaster proneness at the local level. The joint WFP/FAO mission was requested to provide guidance and support in the preparation of this PRRO. These include: discussion on targeting areas and people, identification of protracted relief activities, identification of rehabilitation and recovery activities, identification of the requirements in both Non Food Items and Technical assistance.

Targeted Areas and People

The most vulnerable populations are groups such as under-employed urban people, non-farm rural workers, people living in relatively isolated regions, for example the resource poor Northeast, and people in public institutions. The following provinces will be included in the programme due to their high concentration of food insecure people and proneness to natural disasters: South Hamgyong, North Hamgyong, Kangwon, North Pyongan, South Pyongan.

Protracted Relief Component (60% of the food aid resources)

1. Disaster preparedness stockpiling of food commodities. To complement the efforts of the National Red Cross and the International Federation of the Red Cross and Red Crescent Societies (IFRC) and enhance the capacity to timely assist disaster victims, WFP would establish contingency emergency food stocks in the three ports where WFP unloads its food aid;
2. Food for Seed Swap Approaches in order to increase the availability of quality seeds. Given the prevalence of food insecurity in most cooperatives, there is little capacity to allocate part of production to seed. A mechanism can be developed by FAO and WFP in co-operation with the government to barter barley seeds for food and redistribute them to cooperatives lacking seed;
3. Restarting of county level cake/factories/bakeries to increase food intake for children, including the develop of a wheat fortification capacity to supply bakeries;
4. Rehabilitation of sea dikes in order to protect agricultural land and human settlements along the coastal disaster prone areas.

Rehabilitation and recovery component

1. Irrigation and water supply to drought prone areas. Priority will be given to the rehabilitation of damaged canals and to the creation of small to medium scale gravity fed irrigation systems;
2. Flood control and rehabilitation of damaged water courses: An integrated approach would be developed to remove debris in affected river channels, to stabilise or reinforce river banks and to stem erosion in upstream areas through vegetative/ slope management techniques;
3. Reforestation activities: stimulate firewood production, rehabilitation of degraded areas and protection of forested areas. Activities would include seedling production, planting of trees for soil and water conservation, firewood and for protecting and increasing the supply of non wood products from existing forest areas. The PRRO would encourage focus on the cooperative level;
4. Study tours and workshops to expose officials to WFP activities in other countries and to technical developments in the field of forestry and agriculture.
5. Innovative activities and gender oriented programmes (10% unspecified). Additional pilot activities identified during the implementation of the PRRO and introduced in accordance with the Programme objectives;

Many of these activities will require Technical Assistance package that can be executed/coordinated by FAO, provided that funds would be available.
2. INTRODUCTION

2.1. RATIONAL OF THE MISSION

Disaster prevention, disaster preparedness and post-disaster rehabilitation are often only different facets of the same problem. Because nothing has been done to prevent its occurrence, disaster strikes. When the country, the area or the people are not prepared, the impact of the disaster can be dreadful. If rehabilitation does not address some of the basic root causes of the disaster, it is bound to occur again, the same causes producing the same effects. Both FAO and WFP have been concerned by this issue for long time since the economic, social and human costs of natural disasters are high and so are the cost of post-disaster emergency operations. What could reduce the risk (probability of occurrence), the size of a disaster and the magnitude of its impact is a worthwhile investment.

FAO with its commitment to disaster reduction and WFP with its currently discussed and reviewed approaches on development, disaster prevention and recovery, decided to join hands in this mission for the double aim of optimising the use of both know-how and resources. The reported evolution of the Agricultural Rehabilitation and Environment Protection (AREP) Programme from a pure funding mechanism to a broad coordination framework makes this inter-agency collaboration even more justified.

2.2. TERMS OF REFERENCE AND METHODOLOGY OF THE MISSION

The Terms of Reference (TOR) of this mission can be summarised as follows:

**Overall objective**

This Joint FAO/WFP mission had from the very beginning a double objective mission:

- **Objective n°1**: Joint WFP/FAO formulation of the Protracted Relief and Recovery Operation (PRRO), with FAO providing technical inputs and ensuring that keeping the focus on disaster management is maintained;
- **Objective n°2**: Joint FAO/WFP elaboration of a Disaster Preparedness and Impact Mitigation (DPIM) Strategy Under the overall framework of the AREP, with identification of the possible entry points for WFP involvement.

**Methodology to be utilised:**

Part of the methodology will be common to the two objectives, the rest of it will be specific.

**Common to the two objectives:**

- Desk study and review of the literature;
- Briefing by the DPRK authorities about their priorities and strategies in the two concerned sectors within the AREP framework;
- Review of the existing UNDP, FAO and WFP achievements in relation to PRRO and DPIM;
- Review of the collaborative options under the overall AREP framework;
- Establish links with other UN and NGO activities. Special attention will be paid for the early involvement of the TCOR agronomist currently in the field in the overall mission work;
- Analysis of existing natural risks, their dynamics, their locations and the strategy of the authorities to deal with them;
- Analysis of the availability of various means of production (fertiliser, seeds, etc.) and the way it affect food security.
Related to each specific objectives:
This is described in Part 1 and Part 2 of the present document and reflected into the specific terms of reference of each of the mission’s member.

Expected results from the Joint Mission ::

The results of the mission are multiple:

In relation with Objective n°1:
- Provide technical inputs for the preparation of the PRRO;
- Identify needs for a technical assistance package to support the implementation of the PRRO, including technical support to be provided by FAO;

In relation with Objective n°2:
- Provide technical advises for the support to the government efforts to elaborate an overall framework for DPIM;
- Assist the government in the identification of priorities for possible activities with this framework;
- Appraise the requirements in terms of human, financial and other resources (including food aid to be provided by WFP) for the implementation of these activities;
- Assist the government in the elaboration of a Plan of Action, with a budget and a work plan, for the concrete implementation of these activities.

The detailed Terms of Reference are attached as annexe N°1 of this report.

To implement its tacks, the Mission requested a series of meetings and field visits. In most instances, they were granted, which enable the mission to generate an interesting set of primary data. The itinerary of the mission and the list of persons met are respectively annexed as Annex N°2 and N°3,

The mission had also access to a fair amount of secondary data and reports (general as well as specific) produced by many missions and agencies (from the UN system as well as from bilateral sources and Non Governmental Organisations –NGO-). Annex N°4 consists of the bibliography consulted.

A series of meetings took place at the end of the mission to discuss the draft proposal of the PRRO as well as certain elements related to Disaster management. A final draft of the PROO and of the report of the FAO DPIM Consultant were handed out before departure from the country.
3. BACKGROUND INFORMATION ON DPRK

3.1. DPRK AND ITS ECONOMY IN THE LAST TWO DECADES

The Korean civilisation is an ancient one which deserves due respect. It is also an harsh and beautiful country, where the climate can be very rigorous. After the 1952 war, the part of the Korean peninsula that became the Democratic People’s Republic of Korea (DPRK) was left in ruins. A strong commitment of the Authorities managed to transform this devastated country into a modern State with a vivid national identity, relatively well functioning health and education institutions, a productive agricultural sector and, above all, a strong industrial basis. DPRK became in a few decades a industrialised country, where about 60% of the population was urban and working in factories and services. DPRK industry was on the one hand largely depending on its own resources for energy (coal mines and hydropower) but still totally depending from the outside for oil-based fuel as well as for many other raw material. In these difficult conditions, DPRK managed to achieve remarkable results: with a GDP estimated above 1,000 US$ at the end of the 1980ies, an health system covering most needs in the public health sector which enable a fast elevation of the longevity of the population, an impressive road and railway network, and electricity down to most villages.

The changes in former Soviet Union and in China resulted into the losses of key markets for DPRK goods and critical sources of oil and raw material. Ten years after, DPRK continues to suffer from a severely depressed economic sector. The state of the economy limits the ability of the country to import food to close the resulting substantial food import gap. It also reflects a growing need to upgrade infrastructure requirements, particularly in the industrial and agricultural sectors; and address continuing energy and fuel shortages as well as preventing further deterioration of public health systems. Economic output has declined from $20.8 billion in 1992, to $10.6 billion in 1996. Per capita income has dropped from $1,005 in 1992, to $481 in 1996 according to UNDP. Domestic agricultural cereal production has declined, and commercial food imports have been reduced. Factories are under-utilised, or closed, due to insufficient raw materials, energy and spare parts. There has been difficulty in maintaining public infrastructure including roads, electricity, water and sanitation facilities. Hospitals suffer from a lack of medicines, heating fuel, equipment and food for patients. There are public health concerns related to an increase of respiratory and diarrhoeal disease.

Agricultural potential is limited by the fact that only 18 – 20 percent of this mainly mountainous country is arable and there is a relatively short growing season between severe winters. Overall agricultural production in DPRK has been declining as the result of a combination of natural disasters since 1994 natural disasters, environmental degradation, and economic difficulties inducing a lack of agricultural inputs including fuel, quality seeds, fertilisers, mechanisation, pesticides, and herbicides. Cereal production, mainly maize and rice, has decreased from over 8 million Mts. in the 1980’s, to around 3 to 3.5 million Mts. in 1997 and 1998. Commercial food imports of up to one million Mts. of cereals per year in the 1980s have declined to less than 500,000 Mts. in the last several years. All these factors seriously compromised the national food security. While large amounts of food aid and, in general humanitarian assistance for vulnerable groups, has been delivered, the food supply situation remains precarious.

Furthermore, there is concern with regard to environmental damage. Much forest land has been cleared on steep mountain sides, both for firewood and for land to grow crops. This jeopardises the ecological balance and may lead to landslides and further flooding.
3.2. NATURAL CONDITIONS AND UTILISATION OF NATURAL RESOURCES

The natural conditions are very diverse and so are the agricultural systems. Four agro-ecosystems have been identified during the mission.

A mountainous northern part and centre:

The geological substratum is mainly crystalline rocks, such as granite, as well as old metamorphic materials (shists) with widely spread coal veins. The climate is reported to be extremely rigorous, with more than three months below 0°C and two other below the 0-vegetation level. The soils resulting from the nature of this substratum are acid, with often a high content of sand. In the areas where shist is the underlying substratum material, high content of gley can also be expected. This will have important repercussion in both the level of proneness to erosion and the fertility of different areas. Covered by forest (mono populated with either conifers or broad-leaved deciduous trees or mixed forest), this mountainous hinterland can be considered as the water reservoir of the country. Most rivers have their source located there. The patterns of food security and of the factors affecting it are very specific of this area, with a relatively low population living in the hinterland and a large industrial cities located along the eastern coast.

The medium hill crown:

Bordering the highlands both eastwards, westwards and southwards, this crown of medium hill is characterised by small/narrow valleys where only limited land would be flat enough for paddy cultivation. Most of the crops grown are upland crops such as maize, wheat, barley, potatoes, a few legumes and, around human settlements, vegetables for the traditional “Kimchi” (traditional preserve). Fruit trees are also present in important quantities, often planted on small terraces. When possible, diversion dam are re-directing part of the river flows towards whatever limited flat land exists, in order to enable at least a minimum of irrigation. Cold whether is limiting the duration of the growing period of the crops, especially rice and maize. Winter wheat and barley seem to perform well, although the risk of drought has been reported as important. Access to wild resources (wood, mushrooms, acorn, raw material for traditional medicine) has been for ages an important element of the functioning of the co-operatives located in these medium hills.

The plains with their small sparsely dispersed small hills:

These plains exist under two formats: the large plains in the south-west of the country, which represent the heart of the national breadbasket, and the smaller, yet still sizeable plains on the eastern coast, which represent the food rear base of the industrial cities located there. When feasible, paddy is cultivated. This requires flat land deserved by irrigation facilities. When soil undulations do not permit good control of the water level in the field, upland crops, such as maize, corn, barley, wheat, legumes, tobacco, vegetables, etc. are cultivated. One should note the tendency to create new rice fields at the expenses of these undulated areas, by terracing and various important earthmoving exercises. Soils in these plains and nearby undulated areas fields vary from sandy clay to loamy sand, depending on the origin of the alluvial deposit and the position of the field in the topo-sequence. An important development in the southern plains has been the focus on double cropping in order to increase the cropping index of the area. Climatic constraints, availability of manpower during certain bottlenecks in the crop calendar as well as difficulties affecting fertility reproduction and pest control are among other the key limiting factors for expending this technical itinerary.
The areas reclaimed from the sea:

This type of area is present in various locations on the western coast and represents an important potential for both rice cultivation (if using salt resistant varieties), salt extraction, and various type of algae/shell production. Due to its position below sea level or close to sea level and its western orientation (toward a typhoon/tidal wave generating sea), it is highly prone to disasters, such as tidal wave, flood from inland coinciding with high sea level, etc. These different factors (geological substratum, climate, and place in the topo-sequence, vegetation cover) are affecting the soil genesis, which results into a high variability of soils of different fertility and resistance to erosion factors. This zoning was checked at a second stage with the differentiation of agro-ecological zones made by the Academy of Agriculture. Both are in full concordance. The following map and trans-section have been prepared using both existing maps and information, and visual observations made during the mission.
The following West-East is aimed at identifying the various agro-ecosystems, with their location in the topo-sequence and the hazard/vulnerability/risk associated with this position.

**Trans-section of DPRK agro-ecosystems**

1 : Sea : The sea is reported to be an important source of fish, sea weeds, shells which used to play an important role in the export/import balance of DPRK as well as in the nutritional status of its population. Could be at the origin of tidal waves and tsunami.

2 : Polder area protected by a sea dike : In a “land hungry” country, reclaiming land from the sea and thus increasing availability of space is crucial. Constraints here are the high salt content of the soils and the proneness to tidal waves and other sea-related phenomena.

3 : Plains with small hills : This is the rice bowl of the country. Flat land with often relatively high gley content in the soil and relatively easy access to irrigation infrastructures (they are located rather at the lower part of the river networks) make them quite suitable for productive agriculture. Their low position make them susceptible to flood in case of important rain falls in the highlands. The presence of small hills facilitates the creation of fruit tree plantations. The population density in this area is rather high due to its favourable conditions. This increases the magnitude of the impact of any disaster.

4 : Medium hill belt : With limited flat land and sometimes quite narrow valleys, this area is more specialised in upland crops, fruit trees, and exploitation of forest products. The steepness of the slopes make the area quite prone to landslide while the narrowness of the valleys could increase the destructive effect of flash flood on human settlements (most of the time located at the limit of the “flood fringes”). The permanent interaction between forested land and human activities increases as well the risk of forest fire.

5 : Mountainous areas : Mainly forested area with low population density. Represents the water reservoir of the country since most rivers originate from it. Its degradation would affect dramatically the ecological equilibrium of the whole country.

6 : Small coastal plains of the eastern coast : Having many similarities with the western large plains in terms of topography and potentials, these eastern coast plains nevertheless diver from the western ones by their more limited extend and by the impact of cold winds coming from the Eastern Korean Sea.
Cropping patterns vary from one area to another. Various factors affect them and contribute to a certain diversity which in fact constitutes one of the major element of farmers and cooperatives risk mitigation strategy. That is why the analysis of this diversity is so important within a global Disaster Prevention and Preparedness Plan and an Impact Mitigation strategy.

- In general, rainfall is either just sufficient or in deficit for many crops if compared with the evaporation (see table below, where climatic data are extracted from the IFAD agricultural sector review). In addition, inter-annual variations are important and unpredictable. The risk of drought is high. Irrigation is definitely a crucial asset.

- The existence of a North-South climatic gradient (colder in the North, warmer in the Southern parts) affects the cropping calendar. The beginning of the cycle, its end, and the risk of frost are important features affecting the whole country, but more the Northern provinces. Not only can the cold period (below 0 vegetation) reduce the length of the growing period. A late frost at an early stage of nursery establishment or fruit tree blossom can have devastating effect: nurseries have to be re-sown. Fruit harvest can be minimal, if not nihil;

- The proneness of moisture stress declines from barley to wheat, with maize being much more sensitive to it. Maize-borne farming systems are therefore more prone to face losses in production during dry years than the others;

- To deal with these factors, including the tendency of fertility reduction due to the lack of fertiliser, cooperatives are implementing on a large scale crop associations and, when feasible, the Double Cropping system. Among the various crop associations, one can pinpoint: wheat inter-cropped with maize, wheat inter-cropped with soya bean, maize inter-cropped with barley.

**Crop and climatic calendar (with climatic data from Hamyung province)**

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<tr>
<th>Crops</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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<tr>
<td>Rainfall (mm)</td>
<td>23</td>
<td>14</td>
<td>24</td>
<td>35</td>
<td>64</td>
<td>121</td>
<td>142</td>
<td>200</td>
<td>106</td>
<td>44</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Temperature (°Celsius)</td>
<td>-5.4°</td>
<td>-3.3°</td>
<td>+2.1°</td>
<td>+9.1°</td>
<td>+15°</td>
<td>+18.6</td>
<td>+22.2°</td>
<td>+22.9°</td>
<td>+18.1°</td>
<td>+11.9°</td>
<td>+4.5°</td>
<td>-2.5°</td>
</tr>
<tr>
<td>Evaporation (mm)</td>
<td>41</td>
<td>50</td>
<td>98</td>
<td>155</td>
<td>220</td>
<td>175</td>
<td>173</td>
<td>155</td>
<td>117</td>
<td>101</td>
<td>57</td>
<td>45</td>
</tr>
<tr>
<td>Rice</td>
<td>---</td>
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<tr>
<td>Maize</td>
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<tr>
<td>Wheat</td>
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<tr>
<td>Winter Barley</td>
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<tr>
<td>Spring Barley</td>
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</tr>
<tr>
<td>Potatoes</td>
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<td>---</td>
</tr>
<tr>
<td>Vegetables</td>
<td>---</td>
<td>---</td>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Fruits</td>
<td>---</td>
<td>---</td>
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<td>---</td>
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<td>---</td>
</tr>
</tbody>
</table>

P: Planting; S: Sowing; N: Establishment of nurseries; T: Transplanting; H: Harvesting
3.3. RECENT EVOLUTION

Recent evolution in the general economy:

- **The Embargo**: The embargo has a increasing impact on the economy at large and on the life of the people of DPRK. As a result, the global food deficit remains high.

- **The stagnation of the industrial sector**: In an industrial economy, the disruption of the supply lines for the raw material and energy, problems affecting the normal mechanisms to pay the labour force and the difficulties to access export markets typically leads to dramatic problems for the urban industrial workers as well as to the non-farm rural inhabitants. DPRK is not escaping this saddening process. Closed factories means impoverishment of people and increased food insecurity for the urban population.

- **Increased informal exchanges between cities and rural areas**: This is very important in the context of a industrialised country where a large part of the labour forces used to be engaged in industrial work and services. The importance of the links between urban families and their relatives in the countryside have to be underlined. This is nevertheless nothing new in essence. Family links and self-help are an important component of the national culture.

Recent evolution in relation to the agricultural sector:

Since the collapse of the fertiliser industry and the 1995 natural disasters, a series of important phenomenon have affected the agricultural sector:

- **Heavy reliance on draught animal and on manual labour**: It has been reported and verify by visual observation that the disruption of the “fuel supply line” brought the Korean farmers to traditional animal energy with double or simple yarn ploughs and to an increased use of manual labour. This dramatically affects labour productivity which went from the 10 ha/farm worker under the previous mechanised system to a between 0.5 and 0.9 ha/farm workers under a draught animal/manual system.

- **Heavy reliance on natural organic fertilisers**: Although the use of organic manure is nothing new in the Korean agriculture, the ingenuous farmers and cooperative workers have developed many ways to supply their fields with plant nutrients since the “raw material crisis” started to affect the national fertiliser industry. The environmental impact and agronomic effectiveness of these farming practices shall nevertheless be followed with attention.

- **Heavy reliance on locally made pesticides**: Here again, the century old knowledge of plants and traditional medicines are playing an important role in lessening, at least to a certain extend, the reduction in the quantities and types of chemical available. Plant made insecticides from tobacco leaves (nicotine is a knock-down insecticide) or perythrenoids, as well a traditional antibiotics for the livestock are produced and used widely;

- **Increased access to forested areas**: This is both for gathering wild food and wood, and to create new agricultural land. These small fields are surrounded by little fences, which indicate a “family tenure” status;

- **Decentralised decision making process**: The application of the “Juche Principle” to the stimulation of local production results into a partial transfer of the decision making level to decentralised Authorities and to the cooperatives. As a very positive result, the co-operatives seem to enjoy an appreciable level of self reliance in their own decision making processes;
- **Important changes in the livestock sector**: DPRK used to have a sophisticated system of animal rearing state farms supported by a veterinary system down to the farm level. Until the beginning of the 1990ies, the system was functioning more on the basis of zero-grazing practices for the ruminants and intensive large farm systems for pigs and chickens. With the increased food deficit, these practices turned out to be unsustainable. Most of the ruminants are now fed in the fields. Oxen are more and more required for animal traction at a time of the year when grass is not very abundant, which results in the relatively weak health status. Pigs and chicken are more of a “family based activity” than a “State farm activity”, thus facilitating the feeding of the animals with kitchen wastes and other alternative food (this is however related with a sharp decrease of the pig and chicken population –down by 60 to 70% according to IFAD). Veterinary drugs and vaccines are rare, since most of the raw material to make the medicines has to be imported. Although an increased use of traditional plant-based drugs seems to be taking place, this diminished access to the basic preventive and curative prophylactics might result in increased mortality and morbidity and a lowering of productivity. The risks of epidemic phenomena is probably as well on the rise.

- **Alternative coping mechanisms**: Although no access has been granted to them, it is reported that the “farmer markets” are flourishing. The Authorities have been very wise in that matter. Movements back and forth between urban and rural family members to short term displacements in search of food and other items as part of the survival strategies.

**Recent evolution in relation to the access for Aid workers to the population**:

There is only a few issues which have raised as much discussions that the issue of monitoring of assistance in DPRK. It seems that in the medium run, a lot of progresses have been achieved, and that there are still more to come. From every body confined in an hotel in Pyong Yang in 1995, there are now at least 5 UN or NGO sub-offices in the provinces and a “free ride autorisation” in Pyong Yang city. Monitoring remains sometimes cumbersome, but progresses are obvious. Family visits and interviews, which were totally impossible 4 years ago, are now possible, although relatively controlled. The level of freedom of speech and the openness both at the central FDRC level down to the cooperative and individual levels, has been sometime astonishing during the mission. The recent surveying exercises based on relatively randomised procedures (the WFP/UNICEF/EU nutritional survey and the UNICEF multi-indicators cluster survey) have to be considered as important breakthrough, despite their obvious limits. Agencies should nevertheless continue to negotiate better access since the current monitoring conditions are still far below what is normally accepted. The proposed involvement of FAO Food Security Unit together with WFP VAM might be a good occasion in that direction.

**The food crisis at the child and family levels: to be tackled in an integrated manner**:

Lack of food or unbalanced food intake are crucial elements in the deterioration of child nutritional status. Yet there are other important factors, related to health, hygiene, and living conditions (with a strong question mark on heating during the cold autumn-winter-early spring period). During the spring months for instance, large quantities of “alternative mineral fertilisers” (industrial residues) and human-borne organic fertilisers are likely to contaminate water courses and create health problems that could dramatically diminish the biological use of food intake. Similarly, low temperature would increase calorie requirements of the body. If heating is not possible, the food needs simply increases drastically.
4. DISASTER PREPAREDNESS AND MITIGATION

4.1. THE DISASTER CYCLE

A disaster is an event of a high magnitude which creates disturbances affecting the well being and even the survival of people. It is often accompanied by important economic losses. It is caused by either only natural causes or, more frequently, by the combination of natural causes and man-created imbalances. There are various interlinked components in this Disaster cycle. Approaching them in an integrated manner is the key of good practices in terms of Disaster management.

The Disaster Cycle Concept

Various actors, both national and international, would normally be involved in on or several segments of this integrated approach. Thus this requires an enhanced level of interagency co-ordination at all levels.

This is a very strong argument for promoting the ideas that FDRC, which is an highly efficient but ad-hoc structure to become the National Disaster Management Commission (NDMC). This new status would enable it not only to continue its current tasks of co-ordination post flood relief and recovery, but also to enlarge its role to the promotion of disaster preparedness complementarily with the National Red Cross and to co-ordinate an All Disaster National Early Warning System. (ADNEWS).
4.2. RISK AND VULNERABILITY ANALYSIS

The establishment of hazards, vulnerabilities and risk through a Hazard, Vulnerability and Risk Analysis (HaVRA) is the first phase of a Disaster Preparedness and Impact Mitigation (DPIM) programme. During the mission in DPRK, the following table has been established, taking into account primary, secondary and tertiary information:

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Vulnerability</th>
<th>Risks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash floods and small scale flood</td>
<td>Small valleys in the hills or river courses in the foothill areas</td>
<td>Was not referred as frequent util relatively recently.</td>
<td>Frequency will probably increase with the deforestation.</td>
</tr>
<tr>
<td>Large scale flood</td>
<td>Large plains, especially close to the coastal area. More vulnerable are the areas below sea level</td>
<td>Increasing closer to the sea side. Linked with the simultaneity of heavy rains and high level of tidal</td>
<td>Historical research would be needed to trace past events, especially those that occurred prior to the War.</td>
</tr>
<tr>
<td>Land slides</td>
<td>All the hill and mountainous</td>
<td>Increasing with the steepness of the slope</td>
<td>Risk is increasing with the deforestation. Siltation of dams and rivers could create additional hazards by disturbing river flows and water storage capacity</td>
</tr>
<tr>
<td>Tsunami (Tidal wave)</td>
<td>Large plains, especially close to the coastal area. More vulnerable are the areas below sea level</td>
<td>High magnitude events relatively rare</td>
<td>Events on the Japanese coastal area to be monitored and lesson learned</td>
</tr>
<tr>
<td>Drought</td>
<td>All the areas with un-irrigated upland cropping, especially those planted during the early part of the growing season. Crops like corn are specially sensitive to drought</td>
<td>Probability to have a dry spell in May-June is high</td>
<td>Comprehensive frequency analysis of rainfall data would require access to more information.</td>
</tr>
<tr>
<td>Frost</td>
<td>Most areas, especially in the centre and north. Can effect all annual and perennial crops (fruit trees)</td>
<td>Reduce growth period frequently. Reduce growth rate by cooling the irrigation water</td>
<td>This is probably both a very spread and very site specific phenomenon</td>
</tr>
<tr>
<td>Insect infestation</td>
<td>Could become a problem because the important use of pesticide has probably decimated the useful insects (pests of the pests)</td>
<td>Risk will increase together with the increase of the cropping index,</td>
<td>Integrated pest management should be supported, as well as the use of plant-made insecticides and repellents</td>
</tr>
<tr>
<td>Plant diseases</td>
<td>Could affect either crops as well as forest trees</td>
<td>Risk will increase together with the increase of the cropping index,</td>
<td>Will increase with the introduction of seeds and planting material from the outside</td>
</tr>
<tr>
<td>Zoo-epidemics</td>
<td>Diseases reported are covering a large spectrum for all the animals (goats, cows, pigs, chicken)</td>
<td>Increased vulnerability due to the weakening of diagnosis and vaccination capacity. Reduced partly by the dissemination of animals after the closing of many large scale farms</td>
<td>In addition to the expanded prevention campaign able to reduce drastically the risks of epidemic, there is a need to set up a minimum network of sentinel sites equipped with a diagnosis capacity.</td>
</tr>
<tr>
<td>Forest Fire</td>
<td>More vulnerable areas are monospecies coniferous fosst close to human settlements</td>
<td>Increasing early spring and late autumn, when the trees are get dry.</td>
<td>Will also increase as part of the apparition of a slash and burn cultivation system</td>
</tr>
<tr>
<td>Earthquake</td>
<td>No mention</td>
<td>No mention</td>
<td>Close monitoring of the tectonic and seismic activities in the neighbouring areas would be useful.</td>
</tr>
</tbody>
</table>
4.2. THE GRID OF DIFFERENTIATED VULNERABILITIES

One recently designed tool to map, identify priorities by the exercise of crossing natural and socio-economic factors of vulnerability is the Grid of Differentiated Vulnerabilities (GDV). It starts from the very basic following assumptions:

- Natural conditions are often very diverse in a country. It is important to analyse and map this diversity;

- Natural risks can also be quite diversified. Some of them are context specific (in tectonically active areas, in mountainous areas, in deltaic areas) while other can be of a wider scope: large scale drought, wave of cold air related to broader flows in the atmosphere, etc.);

- Each of these contexts in which human have settled have positive and negative factors that would enable the development of coping mechanisms: intensification of cropping index, use of wild food, heavy reliance on labour exchange and selling of manpower, etc;

- Populations themselves are not homogeneous: not only the urban/rural dialectic has to be taken into account, but also the strength, the availability of manpower at the family level, the status prior to the disaster, the location in relation to the disaster site, etc. It is crucial to identify these factors and to establish a typology of the populations and groups accordingly.

By crossing these natural and socio-economic criteria, one can establish a Grid of Differentiated Vulnerability (GDV). It will on the one hand enable a better understanding of the various factors affecting vulnerability, and on the hand facilitate identification of entry points for all kinds of activities, ranging from disaster prevention, disaster preparedness, relief and rehabilitation.

One can use this grid to establish priorities. By drawing a line from the left lower corner to the right upper one, it is possible to identify the priorities by order of importance.

- The most vulnerable groups are at those occupying the upper left part of the grid;
- The less vulnerable ones can be fund in the lower right part of the grid;

This approach is an attempt for reaching an acceptable level of modelisation. Of course, additional surveys and studies would be useful to go more in-depth into the understanding of the patterns of food insecurity and vulnerability. This could be an interesting occasion for FAO Food Security and Nutrition Units and WFP Vulnerability Analysis and Mapping (VAM) to work together.
## Grid of Differentiated Vulnerabilities of DPRK

<table>
<thead>
<tr>
<th>Natural conditions</th>
<th>Urban areas</th>
<th>Mountainous et hilly areas in the North-east</th>
<th>Medium hills in the North</th>
<th>Medium hills in the South</th>
<th>Fertile large plains in the Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social cases falling out of the social network (street children, etc.)</td>
<td>Large cities (except Pyong Yang)</td>
<td>Small rural towns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lonely Elderly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orphans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non farming families with no farming relatives</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non farming families with farming relatives</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Farming families with urban relatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farming families with no urban relatives</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
### 4.3. EXISTING RISK COPING MECHANISMS AT ALL LEVELS

Neither the State of DPRK nor its inhabitants have remained immobile in front of these various risks and the possible or actual impact of natural disasters. A set of measures and activities have been or are being implemented, with or without the support of the international community. They are summarised in the following table:

<table>
<thead>
<tr>
<th>Level</th>
<th>Hazards</th>
<th>Measures or strategies</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td>Flood</td>
<td>Set up a national Early Warning System as part of a National Disaster management Plan</td>
<td>This should be connected with regional and world wide Early Warning Systems;</td>
</tr>
<tr>
<td></td>
<td>Drought</td>
<td>Establish decentralized stocks of relief item</td>
<td>The Red Cross plays an important role in disaster preparedness and Rapid Response capacity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Red Cross plays an important role in disaster preparedness and Rapid Response capacity;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Local early warning to be reinforced, including connectivity between rain data and dam level management;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Red Cross plays an important role in disaster preparedness and Rapid Response capacity;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The sentinel sites set up by UNICEF would be useful provided interesting perspectives if integrated in a EWS network;</td>
</tr>
<tr>
<td>Local authorities</td>
<td>Flood</td>
<td>Connect with meteorological network;</td>
<td>Local early warning to be reinforced, including connectivity between rain data and dam level management;</td>
</tr>
<tr>
<td></td>
<td>Drought</td>
<td>Develop flood control mechanisms;</td>
<td>The Red Cross plays an important role in disaster preparedness and Rapid Response capacity;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop irrigation systems;</td>
<td>The sentinel sites set up by UNICEF would be useful provided interesting perspectives if up-graded Training is required;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reinforce water storage capacities</td>
<td>Training is required;</td>
</tr>
<tr>
<td></td>
<td>Forest fire</td>
<td>Establish a forest monitoring system with “forest protectors”, Promote the establishment of firebreaks</td>
<td>Training is required;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Establish quarantines and drug/vaccines stocks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperatives</td>
<td>Drought</td>
<td>Increase multicropping and diversification</td>
<td>Constrained by the lack of diversified genetic material</td>
</tr>
<tr>
<td></td>
<td>Early frost</td>
<td>Develop irrigation schemes</td>
<td>Still create bottlenecks due to shortage of manpower</td>
</tr>
<tr>
<td></td>
<td>Energy shortage</td>
<td>Heavy reliance on “nursery” techniques</td>
<td>Heavy reliance on human labour force for ploughing, fertilisation of the fields, preparation of the alternatives products, etc. Environmental impact of these technologies not yet known.</td>
</tr>
<tr>
<td></td>
<td>Disruption of the supply line for fertilizer and pesticides</td>
<td>Develop alternative sources of fertilizers (compost, recycled coal ashes, straw, etc.), Develop alternative sources of pesticides (tobacco, etc.)</td>
<td>This impacts strongly on the overall food availability in the PDS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tend to keep more their own production and release less production through the PDS</td>
<td></td>
</tr>
<tr>
<td>Individual farmers</td>
<td>Food shortage</td>
<td>Increase production at the garden level; Gather wild food in the forest; Encroach the forest for agricultural land;</td>
<td>This lead to depletion of the natural resources and the increased risk of erosion</td>
</tr>
<tr>
<td></td>
<td>Fuel shortage</td>
<td>Move more between locations in search of food; Gather wood and burning material in the forest;</td>
<td></td>
</tr>
<tr>
<td>Urban families</td>
<td>Food shortage</td>
<td>Increase production at the garden level, Try to access land outside of the town, Rely more and more on rural relatives, Gather wild food in the forest, Try to be incorporated into FFW schemes, Utilise other types of mechanisms to access food (farmers markets, etc.)</td>
<td>This lead to depletion of the natural resources and the increased risk of erosion</td>
</tr>
<tr>
<td></td>
<td>Fuel shortage</td>
<td>Move more between locations in search of food;</td>
<td>Sign of decapitalisation can probably be observed at the “back street markets”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gather all kind of burning materials</td>
<td></td>
</tr>
</tbody>
</table>
4.5. DEALING WITH CAUSES : PROACTIVE APPROACHES

There are seven key proactive elements of a Disaster Prevention and Preparedness Strategy (DPPS):

- **Understanding the events and there root causes:** The “knowledge” component of this exercise partly lies with the establishment of the HaVRA and has been dealt with in length in paragraph 4.2. The analysis of the events and the identification of the factors inducing “disaster proneness” is however “disaster specific” and requires a multidisciplinary approach, using agrometeorology, bio-climatology, geology, soil science, civil engineering, forestry, animal sciences, epidemiology, etc;

- **Recording of the scope and size of the problems:** To be able to spot on the map areas regularly affected as well as of the magnitude of the impact of past events is an important tool for proactive management of disaster (this is what “prevention and preparedness” means). This has to do with mapping. The coming UNDP GIS project would be a very useful tool for that undertaking, provided that it receives the proper technical guidance;

- **Addressing the root causes:** Once that root causes and geographical identification of disaster prone areas is carried out, it becomes possible to undertake the appropriate preventive measures and to prepare the mechanisms that could make an early action possible and effective;

The vicious spiral of the root causes of floods and land slides

Although this has to be confirmed from historical sources, physical evidences indicate that prevention of natural disaster has been a concern for the DPRK Authorities since the mid 50ies, just after the war. However, it seems that, during the last few years there has been a worrying concentration of natural disasters. Will this remain conjectural or is it a sign of a recent acceleration in the occurrence of natural disaster, specially floods? Analysis of the root causes gives an entry point for disaster prevention. The observation made visit in three provinces undertaken during the mission very much suggest that ongoing management of natural cover is increasingly creating disaster proneness:

- Due to the lack of coal available, people have more and more to rely on wood, and cellulose based forest and non forest-products for the heating of the houses during the harsh winters and for the cooking of food;
- In relation with the ongoing food shortage, « land—hungry » farmers are more and more encroaching the forested areas in order to expand the arable land. This process can result into large areas with steep slopes being deforested and turned into maize or wheat fields.

As a combined result of these two phenomena, both water retention capacity and land resistance to surface and deeper-layer erosion get reduced: run off increases and superficial soil material is drain down the hills, resulting in both losses in arable land and increased siltation in the downstream river courses. At one stage, especially when tree root density goes down to a certain level (this level being linked to the nature of substratum and of the soil, as well as to the steepness of the slopes) deeper layer of the hill material can be fragilised. This can end-up in small to large scale land slides. Then, one frequently observe the cumulative of accelerated and increased run off on the one hand and of landslides which create localised fragile water retarding basins. When they collapse, the flood wave can be devastating. This type of flash flood is very common in zones directly adjacent to hill or mountainous areas. If the water course downstream are not able to cope with the quantity of water and sediments suddenly coming, then the flash flood could become a real damaging event on human settlement and agricultural land.

This calls for a proactive and integrated « upstream to downstream » approach to water catchment management.
Three other examples of proactive disaster prevention and vulnerability reduction measures, which have been identified as priorities for DPRK and very relevant with the observation made during the field visits, are presented below:

**Food security and irrigation**

Frequency analysis of the climatic conditions in DPRK, although based on a limited quantity of information, shows that risks of drought is relatively high. Strategy to tackle this risk varies from one agro-ecological region to another:

- In the Southern plains, irrigated rice based farming systems has been for long time the main element of the “anti-drought” strategy. This was heavily reliant on electric pumping stations
- In the central undulated areas and low hills intersected by low lying lands, the corn/wheat based farming systems are more sensitive to drought than the irrigated paddies. The Authorities have developed an extended programme to increase the area under irrigation, either upland crops with sprinkle irrigation, or by transforming undulated lands and low hills into paddy fields through a major land transformation and reclamation scheme
- In the medium hills, irrigation is based on diversion dikes redirecting part of the water flows in gravity fed canals that enable irrigation water to reach at least certain flat areas downstream.

It makes a lot of sense to support this policy, although a certain number of strategic priorities and technical standards have to be established, taking into account both DPRK’s objectives and WFP specific mandate, and ensuring that proposals will be technically feasible with FFW as the main resource, ecologically sound, economically viable.

With these criteria as the background, it is suggested that priority is given to:

- Support projects of a manageable size, with the focus units being cooperatives or groups of cooperatives at the county level
- Support to project areas where the main objective is to switch from pumping to gravity fed irrigation
- Support projects in areas potentially affected by natural disasters

Knowing that the development of irrigation means in fact much more than just bringing water to an area, but also new crop pest and fertility management, the authorities will have to commit themselves to ensuring the appropriate technical back-up and extension work in favour of the population living and benefiting of the projects chosen.

**Defending low lying plains against sea water intrusion**:

In a country where land is a scarce resource, there is a strong rationale in both trying to expand the area by creating polders, and to ensure the appropriate protection in the low lying often over-populated flat plains bordering the coastal areas. Indeed, most of these areas are very appropriate for rice cultivation (flat land, important rives close to estuaries where water flow is important and enable the diversion of a lot of fresh water to the irrigation of paddy fields (this has both a “water supply effect” and a “desalinisation effect”).

The low lying position of these areas make them highly vulnerable to above normal height tidal waves. Although the probability of occurrence is not extremely high, the magnitude of the damage that can result from such events is often significant, making sea dikes a worthwhile investment.

Due to the position of these plains at the estuary of the rivers, it could happen that high tidal level could coincide with high run off in the river, thus leading to water exit difficulties and consecutive floods. It could then be useful to reinforce the embankments along the first inland kilometres of the river course.
River course management in flood prone areas:

In many areas, especially the low lying areas at the interface between hills and plains, water course management is an important element of both post disaster intervention and pre-disaster hazard and impact mitigation.

Excess of water flows have indeed to be able to get as quick as possible downstream and river channel calibration should permit that. Simultaneously, the accelerated flow of the excess water should not result into riverbanks degradation, large scale debris deposit and durable overtopping of the river embankments.

Therefore a four pronged strategy is required:

- Rehabilitation of existing embankments damaged by recent floods;
- Debris removal in areas affected by flood in order to facilitate return to normalcy and easy evacuation of potential future water excesses;
- Improvement of the existing embankments when they appear to be insufficiently strong or wrongly designed to cope with aggravated risk;
- Create new embankments in areas identified as increasingly at risk because of the modification of the upstream land use.

- Establishing an Early Warning Capacity: If a phenomenon is known, some of its early stages might be identifiable. Knowing them and being able to recognise them on time in order to prompt early action are the very rationale being the concept of Early Warning Systems (EWS). These EWS have to be in place and functional on a permanent basis and record, analyse and screen information in order to identify unusual events;

- Establishment of an early response capacity: To be either able to increase storage capacity in order to permit irrigation or to release excess of water in order to increase possible storage capacity for retardation basins requires that certain work be carried out beforehand. This principle applies as well to crop pest management of epidemic control. It means “being ready”;

- Increase production and facilitation of arrival of food in the national basket by the promotion of early crops: In a country potentially affected by food deficit, both the size of the deficit and its timing are important. Reducing this size and ensuring food availability during the lean period through early maturing crops are two important element of a famine management strategy.

Food security and seed security: the “Seed for Food” swap

Approaches to tackle food problems during the lean period can be two prong: increase the overall food production and/or ensure a specific food input during the worse months of the deficit period. International efforts to ameliorate the food situation have tried to do use both approach through the Double Cropping Programme (DCP). Sizeable area has been put under cultivation of these two crops, which will be ready for harvest and storage of the produce during June – July 1999. However the availability of seed has been a constraint for many co-operative farms, who wanted to get involved in the DCP or expand the double cropping but could not find enough seed. From this situation, and in accordance with the “Juche Principle”, the idea emerged of a “Food for Seed” swap programme, by which barley or wheat grain of an acceptable seed quality could be exchanged for food in order to constitute seed stocks. Cooperatives in need of more seeds, either to expand the area under barley or wheat, or to replace seed losses in case of a drought, could find than an easily acceptable source of quality seeds. Action plan could be as follows:

i. Estimation of possible area to be planted with barley and wheat in each co-operative farm in need.
ii. Estimation of required quantity of seeds for planting in each of these cooperatives area.
iii. Establishment of the quality control mechanism.
iv. Organisation of the food for seed swap and seed quality control.
v. Distribution of seeds to the co-operatives in need.
- **Advanced Prestocking and stockpiling**: When the disaster strikes, relief items (food shelter, water equipment, health kits, drugs-vaccines and cool boxes in case of an epidemic phenomenon, etc.) have to be on the site as soon as possible. It is often crucial to have stock readily available in the vicinity of potential disaster-prone areas, in order to facilitate early action and limit the time losses at a stage when every minute could count. In DPRK, the National Red Cross and IFRC are already involved in this sector, but with only limited resources. FDRC could get very usefully involved in that sector:

  **Stockpiling as part of the establishment of a Rapid Reaction Capacity**

As part of an overall disaster preparedness, stockpiling of emergency items is of utmost importance. In DPRK, this can be dealt with through two separated, yet complementary mechanisms:

- The National Red Cross Society, supported by the International Federation of the Red Cross (IFRC) will maintain emergency stock comprising food and non food items (blankets, medical kits, high protein biscuits, etc.) in 5 different disaster prone locations in order to be able to react extremely quickly and respond to the most urgent need, but for a short period and for a limited number of population (27,000 families), to disaster;
- The FDRC, through its collaborative arrangement with WFP, will establish under the PRRO a Stock which could be mobilised as a second step in order to take over the food aid after Red Cross stocks are running out. This would provide the back-up after the first emergency operation has started and give some time for the preparation of the following intervention phase as and if required.

Emergency Food Stocks will have to be established in each of the ports where boats unload the WFP food aid since appropriate storage capacity exists in these locations. Stored quantities will be as followed:

The different types of disasters and the specific proactive and reactive strategies to address them will be presented in paragraph 4.6.

In terms of mapping disasters, one has to go back to their very nature. The first step is to map all the “information recording devices” present in the country: Full fledge meteorological stations, simple rain gauges, evapometers, scales for recording water levels in dams, gates, bridges, water flow measuring instruments, seism recording instruments, etc. Then relatively detailed topological and geological maps would be crucially important.

The recording and mapping of certain events would enable the setting up of a Disaster Prevention and Preparedness Data Base. The information to be recorded about trends and events are presented in the following table:
## Data to be collected for GIS-related Disaster preparedness

<table>
<thead>
<tr>
<th>Disasters</th>
<th>Baseline data</th>
<th>Event specific data</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>Rainfall (depth, intensity, duration)</td>
<td>Flood damage data: Inundation (area, depth, flood water velocity, duration, volumes)</td>
<td>Needs of flood measurements equipment and facilities; Need of comprehensive time series Need of communication equipment</td>
</tr>
<tr>
<td></td>
<td>Stream flow (velocity, discharge)</td>
<td>Damages (losses in human lives, direct and indirect physical damages, direct and indirect economic losses, direct and indirect social losses,)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>River bed (levels mean, flood,)</td>
<td>Measure taken: (relief – evacuation food, shelter, health, and its cost, planed recovery and rehabilitation and their cost)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical setting of the watershed (topography, longitudinal profiles and channel cross sections, channel roughness)</td>
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</tr>
<tr>
<td></td>
<td>Natural conditions of the watershed (soil, land use, and vegetation)</td>
<td></td>
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<tr>
<td></td>
<td>Sediment load (bed materials, suspended materials)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Storm surge (wind data, specific rain fall associated)</td>
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<td></td>
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<tr>
<td></td>
<td>Other natural factors (tidal data, coastal bathymetry, etc.)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Existing infrastructures (dams, weirs, pumping stations, gates, retarding gates)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human settlements and activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drought</td>
<td>Frequency analysis of rain fall (depth, intensity, duration, frequency, date of initiation, dates of termination); Insulation and temperature (intensity, duration, evaporation); Existing infrastructures (dams, weirs, pumping stations, gates, retarding gates); Land use and agricultural activities;</td>
<td>Drought damage data: Seriousness of drought (rainfall deficit, timing of the drought in the plant cycle, duration, area affected, yield reduction) Damages (direct and indirect physical damages, direct and indirect economic losses, direct and indirect social losses,) Measure taken: (irrigation, secondary sowings, food and seed relief and its cost.)</td>
<td>Needs in agro-meteorology and bio-climatology equipment and facilities Need of comprehensive time series Need of communication equipment</td>
</tr>
<tr>
<td>Forest fire</td>
<td>Land use (type of forests, type of tree population); Existing measures taken (fire break)</td>
<td>Past and recent forest fires (type of forest affected, causes, acreage burned, losses in biomass and useful wood) Measures undertaken (fire brigade, village mobilisation, etc.)</td>
<td>Need of communication equipment</td>
</tr>
<tr>
<td>Pest infestation</td>
<td>Agricultural practices (crop rotations, soil preparation, pest management)</td>
<td>Past and Recent pest problems (type of pest, size of area contaminated, frequency of the phenomenon); Measures undertaken (type, cost, efficiency); Damages (area contaminated, yield reduction);</td>
<td>Needs in laboratory facilities Need of communication equipment</td>
</tr>
<tr>
<td></td>
<td>Forestry practices</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Post harvest storing conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal epidemic</td>
<td>Livestock practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Sector specific baseline information</td>
<td>Identification (nature, location, frequency of occurrence, magnitude of the phenomenon, magnitude of the damages of past events)</td>
<td>Need of communication equipment</td>
</tr>
</tbody>
</table>
4.6. DEALING WITH SYMPTOMS : REACTIVE APPROACHES

When the disaster occurs, there are only a few options left:

- To deal with it: this is mainly related to relief activities;
- To deal with its aftermath: this has to do with recovery and rehabilitation;
- To prevent its re-occurrence.

**Early reaction and Relief programmes:**

Apart of the food aid relief programmes which, though necessary, are not falling within FAO’s mandate, there are other types of measures that would useful alleviate on a very short term basis the disaster created difficulties on the agricultural sector. They could comprise:

- Rapid release of water from upstream dams in order to increase the water available for irrigation based drought response;
- Rapid distribution of seeds in order to replant drought or flood affected crops;
- Establishment of mobile irrigation or drainage teams equipped with mobile pumps;
- Vaccination campaigns for animals in order to prevent the spread of an existing epidemic;
- Rapid dead animal incineration campaign in order to prevent further spread of a disease.

**Recovery and rehabilitation:**

Among priorities, rehabilitation of damaged protective and productive infrastructures, such as:

- partially damaged sea dikes;
- destroyed components of irrigation and drainage schemes;
- non functioning river embankments, destroyed tree nurseries.

**Prevention of re-occurrence:**

A lot of the activities coming in that section are very similar to the ones presented in the previous paragraph. The specificity will come from the fact that these activities are to be carried out in areas already affected by the feared natural disasters. This can make peoples’ mobilisation easier and make the programme design process more informed on site specificities.

- Afforestation and management of degraded slopes and forests in upstream catchments and watersheds;
- Reinforcement of water course control mechanisms such as embankments, dikes (even sea dikes), small dams that have already suffered from flood damages;
- Development of an integrated drought management strategy based on the identification of the most “at risk” areas, the identification of drought resistance crops and varieties and the development of appropriate water supply technologies.
4.7. THE « PREVENTION-DETECTION-ALLIVIATION » CONTINUUM

In this paragraph, attempts have been made to make the Disaster Cycle Concept more “disaster specific. Four types of disasters have been chosen as examples: Flood, drought, forest fire and plant diseases. For each of them, a discussion follows the diagram in order to underline the key issues for disaster prevention.

First Applied use of the Disaster Cycle Concept: the case of flood

Key issues related to flood prevention and preparedness are:

- Status and efficiency of the early warning;
- Overall management of water run-off both upstream and downstream, including maintenance of river courses and embankments;
- The importance of the status of the upstream parts of the catchments, especially in relation of forest and vegetation cover and erosion.
Second Applied use of the Disaster Cycle Concept: the case of drought

In view of the existing very diverse farming systems, it is difficult to have “one policy” valid and applicable everywhere. Thus area specific strategies will have to be elaborated:

- In plains and flat land areas: The strategy there has to be based on irrigation with gravity irrigation having the priority. This is especially important for rice, but it can also apply to other cereal through sprinkle irrigation;
- In hills or slightly undulated areas: Outside of rice areas, the strategy will be based on the identification and dissemination of drought resistant crops and varieties, in the design and testing of technical itineraries in which the important phases of the crop yield elaboration are taking place during months where the frequency analysis of the rainfall data indicate a lower risk of dry spell;
- Farming practices should promote techniques that would increase Organic Matter Content of the soil in order to raise soil water storage capacity.

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**Early warning:**
- On the basis of sufficient time series;
- Good back-up of a meteorological data recording network

**Early action:**
- Release of stored water for irrigation;
- Mobilise resources for food procurement;
- Increase donors awareness;

**Emergency activities:**
- Food aid in the affected area;
- Support to marketing mechanisms in order to prevent dramatic price increases;
- Secondary seed distribution if and when possible;

**Introduce drought risk within the development policy:**
- Establish a National Early Warning System;
- Establish a water management body;
- Constitute stockpiles of food and other relief items in the vicinity of the drought prone areas;

**Reinforce systems’ resilience:**
- Identify and promote drought resistant crops and varieties;
- Improve irrigation systems and extend the area under irrigation;
- Increase dam storage capacity

**Support to recovery mechanisms:**
- Food aid to prevent further destitution;
- Micro-credit schemes;
- Seed distribution schemes;

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In view of the existing very diverse farming systems, it is difficult to have “one policy” valid and applicable everywhere. Thus area specific strategies will have to be elaborated:
Third Applied use of the Disaster Cycle Concept: the case of forest fire

**Development:**
- Assess the efficiency of the EWS, EA and ER
- Assess the efficiency of the preventive measures
- Develop new preventive measures (inter-planting of various fire-resistant species)
- Launch awareness campaigns
- National Forestry Plan of Action with a forest fire control component

**Early warning System (EWS):**
- Forest protector reports
- Climatic data recording dry spells at times when the vegetation is still dry and dormant
- Information on wind strength and direction
- Information on water availability in reservoir for fire brigades

**Early Action (EA):**
- Check status of fire breaks and if needed up-greade them
- Warn population of increased risks
- Start counter-fires

**Recovery and rehabilitation (RR):**
- Organise nurseries and plans of action for re-afforestation of burned areas
- Rehabilitate the damages causes on human settlements

**Emergency response (ER):**
- Mobilise fire brigades
- Organise the population
- Organise evacuation of area at risk

**Fourth Applied use of the Disaster Cycle Concept: the case of epidemic**

**Development:**
- Sound animal health policy
- Strong preventive vaccination system
- Strong curative system
- Development of an animal health monitoring mechanism

**Early Warning Systems (EWS):**
- Animal Health workers report
- Slaughtering houses reports
- Health structures reports

**Early Actions (EA):**
- Establish quarantines
- Launch an information campaign
- Reactivate animal health monitoring networks

**Rehabilitation and Recovery (RR):**
- organise animal banks for restocking cooperatives and families
- Replenish veterinary teams’ drug stocks

**Emergency response (ER):**
- Organise vaccination campaigns
- Organise slaughtering of contaminated animals
- Organise burning of dead animals
4.8. INTER AGENCY COOPERATION AND COORDINATION ON DPIM

In general, inter-agency coordination seems to function relatively well in DPRK. A part of the Wednesday weekly Head of Agency Meeting, various sectoral meetings are also taking place, especially in the fields of Health, Agriculture and Nutrition. FAO is of course not the only international actor involved or concerned by DPIM. Other agencies, both within and outside the UN system, have been or are still actively pursuing this matter:

- The Agricultural Recovery and Environmental Protection Programme (AREP) seems to be emerging more and more as a general framework to facilitate co-ordination, reaching coherence, and exchange of information between the aid agencies and with the government, is an important mechanism. It will be geared by a steering committee comprising the main international (UNDP, WFP, FAO, UNICEF, probably representatives of the NGO and of certain Pyongyang based bilateral actors) and national partners. Technical support groups will also exist under the guidance of this steering committee. AREP provides a useful platform for supporting coordination of most of the DPIM and rehabilitation activities and of course, FAO DPIM and WFP PRRO will ensure that they are involved at the proper level in this coordination mechanism.

- WFP with its new approach on disaster prevention and preparedness and its move towards more development oriented activities (presented at WFP Executive Board in the recent months or soon to be discussed in this forum). The involvement of FAO in the design of the PRRO is an example of the operational relations that could be established between the two Rome based agencies;

- UNDP has dropped out its plan for Disaster Management Training (DMT) and redirected the ad-hoc resources to the GIS project. This would be highly valuable provided that the appropriate information is fed into the system. FAO could play an important role in that sector;

- National Red Cross Society and the International Federation of the Red Cross and Red Crescent Societies (IFRC). NRCS and IFRC are already deeply involved in certain aspects of the management of the Disaster Cycle, especially in the training (first aid training, warehouse training, etc.) and in the pre-positioning/stockpiling of relief items in a number of provinces;

- The European Commission Humanitarian Office (ECHO) through its DIPECHO and the European Commission DG VIII A1 in charge of food aid and food security could be interesting partners in the setting up of a National EWS;

- UNICEF has recently embarked into the establishment of a network of sentinel sites in the fields of health, nutrition, water/sanitation and education. Properly guided and supported with the appropriate technical support, this could become a key component of the National EWS. Trends in nutrition could indeed be monitored and correlated with climatic and economic indicators;

- There are interesting collaborative arrangements that could be worked out with the small NGO community in DPRK, and they are extremely receptive to that.
4.9. FOR AN EXPANDED MANDATE OF THE FDRC

From the above, it became more and more clear that an integrated approach to disaster management. This reinforces very much the ideas of an expansion of the mandate of the FDRC from “dealing with the aftermath of the flood” to “managing the national capacity for disaster management”.

FAO would be willing to participate in supporting the FDRC in this transition.

5. MUTUAL REINFORCEMENT OF FAO - WFP ACTIVITIES

5.1. WFP FOOD INPUTS INTO DPIM

In a food deficit area, food could be a very useful “fuel” for many activities. This very much applies to a large range of activities that FAO would very much see being promoted in DPRK, in relation to Disaster Prevention, Disaster Preparedness and Disaster Impact Mitigation.

Of special interest are the three following sectors:

- FFW for water management for both flood control and drought impact reduction;
- FFW for forestry activities in relation to erosion control, watershed management, catchment protection, water conservation and reservation protection against siltation;
- Food supply for the establishment of contingency seed stocks through seed against food swap arrangements;

WFP is placing a Vulnerability Analysis and Mapping (VAM) expert in the region who would cover DPRK. This would be a valuable contribution to the overall understanding and mapping of vulnerability and disaster proneness. This could be coordinated with FAO Food Security and Nutrition Units.

5.2. FAO TECHNICAL INPUTS TO WFP EMOPS AND PRRO

FAO inputs in the preparation of the PRRO have been three fold:

- Refinement of the diagnosis and the situation analysis by FAO Consultant;
- Contribution to the identification of activities to be supported under the PRRO;
- Support to the identification of some of the Non Food Items required;
- Input in the identification of the Technical Assistance (TA) required, including the drafting of Terms of Reference, Job description and required background of the TA.

Field observation and various discussion, including with the visiting “Donor Mission” organised by WFP showed a real need for Technical Assistance in a series of fields:

- Forestry (both land use planning and possibly watershed management to nursery and plantation establishment, including silviculture and forest protection);
- Irrigation (the technical exchanges between the OPEC funded FAO executed TA involved in the large scale irrigation project in South Pyongan and the TA required to support WFP Food For Work support to smaller scale irrigation systems would have to be ensured);
6. A NEED FOR AN ENHANCED FAO PRESENCE IN DPRK

6.1. GENERALITY

In many instances during the mission, the consultant had to request advises from FAO’s technical departments through TCOR. The demand for technical information was high from UN agencies (on tree nursery technology, irrigation, land conservation issues, etc.), from NGO (on potato quality test requirements, toxicity of chemical, etc.) and from the DPRK colleagues. At this stage, the high turn over of consultants cannot help streamlining the “in and out” flow of demands and responses, neither can it ensure a proper confidence building process to get established. There is no doubt that a more stable FAO presence. Here are a few of the “burning issues” in the field of agriculture where an strong FAO presence could, in addition to its support to the PRRO and to DPIM, be extremely useful.

The negotiation fort the presence of this Technical Assistance will probably require a high level mission to DPRK.

6.2. THE DOUBLE CROPPING PROGRAMMES

Only few among the agricultural recovery programmes in DPRK have raised as much expectations and debates than the Double-Cropping Programme. A few very relevant issues have been discussed among the Pyongyang-based agronomists:

- Issues related to crop calendar compatibilities of various technical itineraries;
- Issues related to micro-nutrient management of soils when the cropping index increases;
- Issues related to alternatives to barley and to the introduction of legumes in the cropping patterns;
- Issues related to seed quality: An FAO expert should be able to assist the Ministry of agriculture to trace imported seeds (including those from the United States, from China, etc., and inspect quality and possible presence of diseases;
- In addition, FAO could support any arrangements for the upgrading of timely harvested "grains" into "seeds";
- Issues related to the evaluation of the real "production gain" resulting from the double cropping programme: in view of the overall shortage of inputs in general and of fertiliser and man power in particular, is "1 barley crop + 1 rice crop" hastily planted and harvested yielding significantly more than "1 crop" well managed? Agronomic and economic analysis still remain to be completed.

6.3. THE POTATO ISSUE

In the recent year, the DPRK authorities have been underlining the potential role of potato in food security. As a result, many NGO and some bilateral donors have engaged in providing potato seedlings or supporting potato multiplication schemes. While some programmes seem extremely well thought of and sound technically backed-up (for instance the one implemented by SDR with the support of the well-known agriculture research station of Changins), some others are confronted with short term difficulties and longer term risks. The most worrying one is the large scale potato seed procurement.
6.4. FOR A PROPER SUPPORT IN LAND USE

The acceleration of uncontrolled use of forest land (in particular sloping land) for emergency food production is raising a lot of concerns in relation to land degradation and increasing of disaster proneness. Although this process is part of the survival strategy of the population and there is no point to stop it *per se* during the current high level of prevailing food insecurity (in the absence of any other solution), it should probably be channelled through the establishment of land use plans at both the central and the decentralised levels. FAO technical assistance could help for the establishment of criteria for the identification of sites which should remain forested and/or be reforested.

6.5. FOR AN INTEGRATED APPROACH OF SOIL FERTILITY

Short, medium and long term soil and fertility management is a crucial element of food security and reduction of vulnerability in rural areas. It can also positively or negatively affect the overall national production, thus increasing or reducing the quantity of food available for redistribution to the urban population. The farmers and cooperative members of DPRK have shown an extraordinary aptitude to develop imaginative and creative alternatives for the missing mineral fertilisers. They are as well heavily involved in producing and dispatching organic fertilisers of all kinds of compositions and origins into their fields. However, the DPRK agricultural institutions in charge of soil sciences and soil management seem to be confronted with various difficulties to facilitate a proper management of one of the country’s most precious capital: its soils. FAO technical and material support could be extremely useful in that sector.

6.6. FOR A STRONG SUPPORT IN THE ANIMAL HEALTH SECTOR

In view of the increased role of animals in both production (animal traction) and family food security and with the changing epidemiological context after the closure of many large scale animal farms and redistribution to the cooperatives and families, there is a need to support veterinary services in both their preventive and curative efforts. FAO's capacity and experience in the region is particularly suited to assist DPRK in this field.