



DISASTER MANAGEMENT PLAN

DEPARTMENT OF HORTICULTURE

GOVERNMENT OF HIMACHAL PRADESH

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1. INTRODUCTION

1.1 OVERVIEW OF THE DEPARTMENT

The State Department of Horticulture functions with the objective of building a prosperous Himachal through the scientific development of horticulture by harnessing the natural resources for the development of a sustainable system of agriculture in the hilly areas.

The Department came into existence in September 1970. The pragmatic policies for the development of horticulture of the State Government combined with their adoption by the farmers has resulted in the transformation of the horticulture industry of Himachal Pradesh. The area under horticulture has increased from 791 hectares during the year 1950-51 to 2.24 lac hectares during the year 2014-15. Similarly, the fruit production has increased from 1200 MT during the year 1950-51 to a record 7.52 lakh MT during the year 2014-15. Apples dominate the fruit production by contributing about 86% to the total fruit production of the State. The State has earned the distinction of being the Apple State of India"

Himachal Pradesh has been endowed with a wide range of agro-climatic conditions due to which a large number of horticulture commodities like fruit crops (from temperate to sub-tropical), flowers, vegetables, mushrooms, hops, tea, medicinal & aromatic plants etc. are successfully grown here. Amongst the fruit crops, perhaps all kind of fruits grown in the country, except those which are grown in the warm humid coastal regions, can be produced in the State. Depending upon the agro-climatic conditions and the suitability of a particular area for the growing of specific fruit crops in that area, the State is broadly divided into four agro-climatic zones as described in the table below

| # | Zone description | Elevation range (Meters amsl) | Rainfall (cms) | Suitable fruit crops |
|----|-----------------------------------------------------|-------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Low Hill and Valley Areas near the plains | 365-914 | 60 - 100 | Mango, Litchi, Guava, Loquat, Citrus Fig, Ber, Papaya, Early varieties of Grapes, Jack Fruit, Banana, Low chilling varieties of Peach, Plum and Pear, Strawberry. |
| 2. | Mid Hills (Sub Temperate) | 915-1523 | 90 - 100 | Stone Fruits (Peach, Plum, Apricot, Almond), Persimmon, Pear, Pomegranate, Pecan nut, Walnut, Kiwi Fruit, Strawberry. |
| 3 | High Hills and Valleys in the interiors (Temperate) | 1524-2742 | 90 - 100 | Apple, Pear (Soft), Cherry, Almond, Walnut, Chestnut, Hazelnut, Strawberry. |
| 4 | Cold and Dry Zone (Dry Temperate) | 2743-3656 | 24 - 40 | Apple and Hops, Grapes, Prunes, Drying type of Apricot, Almond, Chilgoza, Pistachio nut, Walnut, Hazel-nut. |

In addition to fruits, vegetable and flower cultivation is undertaken for off-season supplies to the plains, while the mushroom cultivation is being taken up even by the landless for the augmentation of their income. Beekeeping is a necessary activity adjunct to the horticulture industry, which besides providing pollinating agents for improvement of fruit set and productivity, also results in the production of economic

apiculture products like honey and bee wax. The horticulture industry has, therefore plays a great role in the amelioration of the rural economy of the State with respect to:

- Generation of sources for cash income to the rural people,
- Generation of employment opportunities in the pre and post-harvest sectors of the horticulture industry,
- Provision of nutritive foods in the form of fruits, vegetables, nuts, mushrooms, honey, etc.,
- Satisfaction of the aesthetic needs of the people, and
- Development of a sustainable system of permanent agriculture in the hilly areas.

In consideration, the existing scenario of horticulture industry in the State, the development of horticulture in Himachal Pradesh is a priority for the State government. And for this, the government has come with Himachal Pradesh Horticulture Development Project (HPHDP) with the assistance of World Bank. The Project Development Objective (PDO) is “to support small farmers and agro-entrepreneurs to increase the productivity, quality, and market access of selected horticulture commodities in Himachal Pradesh”. It aims to address key well-known gaps and deficiencies in the horticulture sector in Himachal Pradesh and transform the sector (and the overall rural economy) to being more productive, efficient and profitable. It has four Components namely, Horticulture Production and Diversification; Value Addition and Agri-enterprise Development and; Market Development, Project Management, Monitoring and Learning Project Management, Monitoring and Learning. The project would be implemented over a period of seven years. Although the project would cover the entire state, a major proportion of the interventions are proposed in Shimla, Kullu, Kinnaur, Chamba and Mandi districts. The total project cost for this seven year is US\$ 169.0 million and would be funded by IDA credit (US\$ 135.0 million equivalent), the GoHP (US\$ 34.0 million equivalent), and a beneficiary contribution (US\$ XX million equivalent – to be determined).

Role of the department during disasters:

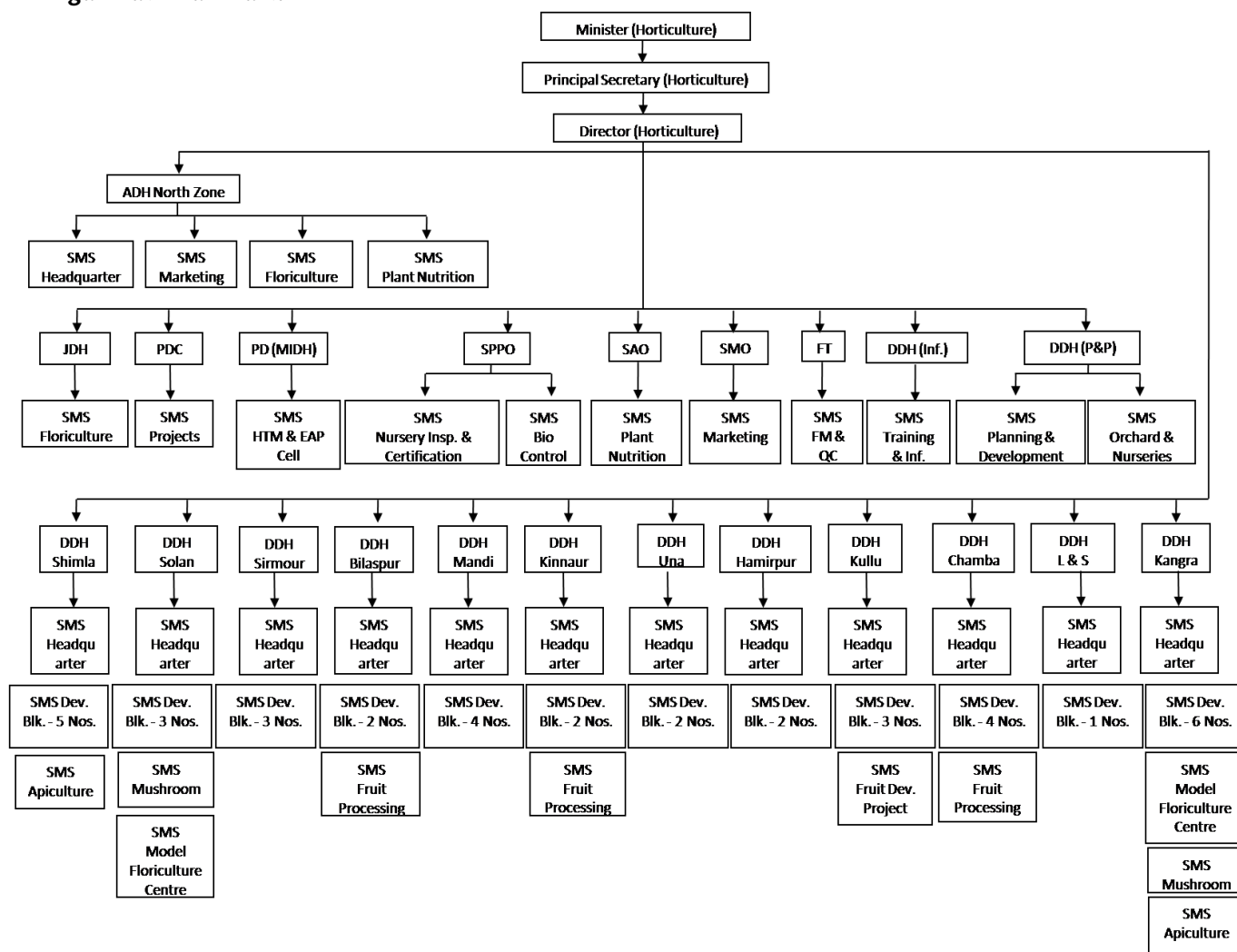
Horticulture Department has been assigned with two major responsibilities for Disaster Management:

- It is the primary agency for hailstorm and pest attack for horticulture sector.
- It should also support in crop damage assessment due to disasters.

Objectives of the Disaster Management Plan:

- To conduct a survey to assess the losses to the horticulture crops in the event of any natural disaster.
- To provide the horticulture extension services to the affected people.
- To organize the farmers training camps in the affected areas to make farmers aware of mitigation efforts and to compensate the losses to fruit crops by taking insurance coverage against natural calamities.
- To undertake training and capacity building of all identified staff working in the field.
- To arrange the horticulture inputs on subsidized rates for providing immediate relief to the farmers affected by any natural calamity.

Organizational chart:



Future strategies for the development of horticulture in the State are:

1. Improvement of productivity of existing horticulture plantations.
2. Quality improvement of horticulture produce.
3. Diversification of the horticulture industry.
4. Modernization of the nursery production programme for the production of virus-free certified planting material on suitable rootstocks.
5. Introduction of improved fruit varieties and rootstocks from advanced countries and their multiplication for supply to the farmers.
6. New orientation to the planting density in the fruit orchards from the present low-density plantation to medium and high-density plantation, with the objective of obtaining higher productivity of quality fruits per unit area.
7. Minimum use of pesticides with emphasis on Integrated Pest Management (IPM) and Biological Control of pests and diseases.
8. Utilization of the information technology for the dissemination of technical know-how and marketing information to the fruit growers.
9. Improvement of water management practices in the orchards through the adoption of scientific water harvesting, storage and application practices.

10. Utilization of high-tech horticulture technologies like protected cultivation of horticulture produce, use of biotechnology, micro-irrigation technologies, use of plastics etc. for the improvement of horticulture productivity.
11. Creation of scientific post-harvest management infrastructure.
12. Value addition and diversification in the processing industry.
13. Market promotion through branding, advertisement and exports.

The ultimate objective of the future strategy is to develop horticulture as an enterprise with the three-dimensional objectives of:

1. Economic Development
2. Nutritional Security
3. Environmental conservation

1.2 PURPOSE OF THE PLAN

The purpose of the departmental plan is to set Standard Operating Procedures (SOPs) and define the clear responsibilities for all sub-departments, agencies under the Horticulture Department and to reduce the risk of disasters, by responding promptly in a very coordinated manner through preparedness at various levels. Main objectives of the plan are to bring all the concerned departments at a single platform in case of before, during and after disaster situation by that they can mitigate the risk aptly and respond accordingly. Some of the objectives are as follows:

- To ensure that community is the main stakeholder of the entire plan and process because a large number of population of Himachal Pradesh is dependent on horticulture for their livelihood practices.
- To ensure that all the components of DM are addressed to facilitate planning, preparedness, operational, coordination and community participation to minimize the horticultural losses.
- To create an environment in which prevention and mitigation measure should be given priority to reducing the risk of any hazards which can harm the assets of the department.
- To ensure smooth relief and response according to the needs of the vulnerable community followed by reconstruction.
- To make the farming community resilient enough to deal with any unlikely events.

1.3 SCOPE OF THE PLAN

In accordance with the Disaster Management Act 2005 and Himachal Pradesh Disaster

Management Plan 2012, the scope of the plan is to handle certain hazard in the state, which affects the department and the sector as a whole. Horticulture being one of the main occupations of the people of Himachal Pradesh has an important role in the economy of the state. Some of the tasks which was considered while making the plan are as follows:

- Identify the vulnerable farming lands and community of the state to different forms of natural calamities as well as man-made hazards.
- The measures to be adopted for prevention and mitigation of disasters.
- Under the Department of Horticulture, all the central and state-sponsored schemes and programmes shall be integrated the disaster management measures.
- The awareness and capacity building of the farming community and staff members is necessary.

- The roles and responsibilities of each agency in relation to pre-during-post disaster phases.

1.4 AUTHORITIES, CODES AND POLICIES

Functioning of Disaster Management in Himachal Pradesh is governed as per the Disaster Management Act 2005 and Himachal Pradesh Disaster Management Plan 2012. Apart from that, various policies and schemes funded by state and central both also contain disaster risk mitigation measures. According to Section 23 of the DM Act 2005, there shall be a DM plan for every state and within the state, there have to be departmental plans for the concerned agencies to deal with disastrous situation smoothly. It provides for the departments of the state governments to draw up their own plans in accordance with the state plan. It also provides for annual review and updating of the departmental plan every year and enjoins upon the state governments to make provisions for financing the activities to be carried out under the departmental plans.

Apart from that, there are guidelines and provision for State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF) which can be claimed by the departments at any stage of the disaster management.

Department of Horticulture will be guided by the following:

- Disaster Management Act 2005
- Himachal Pradesh Disaster Management Plan 2012
- National Guidelines issued by the NDMA
- Guidelines and provision for State Disaster Response Fund (SDRF)
- Guidelines for administration of the National Disaster Response Fund (NDRF).

1.5 INSTITUTIONAL ARRANGEMENTS FOR DISASTER MANAGEMENT

- State Disaster Management Authority under the Chairmanship of Hon'ble Chief Minister is the apex institution for disaster management in the State.
- Minister Horticulture is a member of SDMA (State Disaster Management Authority)
- Secretary (Horticulture) is the Member of the State Executive Secretary
- Advisory Committee where Horticulture Department is represented
- Nodal Officer for DM in the Department.

All departments have been given very specific roles and responsibilities and their nodal agencies and tasks are defined hazard specific. List of the Nodal agency and supporting agency defined hazard specific to H.P. finds below:

| # | Hazards Specific | Nodal Department | Supporting Agencies/Departments/ For Early Warning System |
|---|------------------|------------------------------|--------------------------------------------------------------------------|
| 1 | Pest Attack | Horticulture and Agriculture | University |
| 2 | Hailstorm | Agriculture and Horticulture | IMD, Home and Insurance |
| 3 | Wind Storms | Revenue | IMD, Agriculture and Horticulture, Home |
| 4 | Drought | Agriculture | IMD, Revenue, RD, DRDA, Nauli and Palampur University, Horticulture, S&T |

Some institutional arrangements of the department with respect to disaster management are as follows:

- The Department of Horticulture also provides the seeds and necessary planting materials to the farming community in order to deal with disaster risk and helps into the early recovery of the vulnerable groups of the society.
- As mentioned above in the table, the department of horticulture is the primary agency for hailstorm and pest attack in the horticulture sector.
- To support in crop damage assessment due to disasters.
- To assist the farming community working in the sector, in restoration & relocation efforts in Non-Disaster Time.

1.6 PLAN MANAGEMENT (MONITORING, REVIEW AND REVISION)

Implementation of the Plan

Directorate of Horticulture shall be responsible for implementation of the Plan. The Nodal Officer shall coordinate with all stakeholders for implementing the Plan. Annual Progress on implementation of the Plan will be submitted to HPSDMA.

Revision of the Plan

The Disaster Management Plan is a living document. As per it will be revised on annual basis as per provisions of the DM Act-2005. Any changes in guidelines under the NDRF and SDRF shall be incorporated in the plan as and when such changes are made. The introduction of new technology for hazard risk mitigation shall also be incorporated as when the same is tested and found feasible and acceptable in particular geographical area of the State.

System of Updation

The Plan shall be updated by the Directorate of Horticulture with the help of State Disaster Management Authority at least once in a year or as and when felt necessary. Consultations will be held with the stakeholders for making changes in the Plan. The Nodal Officer shall be responsible for holding consultations and updating the Plan.

Dissemination of Plan

After finalization of the Plan, a copy will be submitted to the HPSDMA for approval. After approval, it shall be disseminated to all agencies, field offices and other stakeholders. Further, whenever it revised/updated, it shall be submitted to HPSDMA for endorsement of changes. The revised Plan shall be shared with all concerned.

2. HAZARD, RISK AND VULNERABILITY ANALYSIS

2.1 RISK ASSESSMENT OF HIMACHAL PRADESH

Hazard Profile of the State:

Himachal Pradesh is a mountainous state situated in the western Himalayas with an elevation ranging from 350 meters to 6000 meters. Thus, there is a great variation in the geo-climatic conditions of the state due to the extreme variation in the elevation. The climate varies from hot and sub-humid tropical in the southern tracts to cold, alpine and glacial in the northern and eastern mountain ranges with increasing elevation. These conditions make the state prone to various hazards both natural and manmade. Main hazards consist of earthquakes, landslides, flash floods, snowstorms and avalanches, droughts, dam failures, fires – domestic and wild, accidents – road, rail, air, stampedes, boat capsizing, biological, industrial and hazardous chemicals etc.

| # | Nature of Disaster | Frequency | Intensity |
|----|--------------------|-----------------|-----------------------|
| 1 | Flood/ Flash Flood | Regular Frame | High |
| 2 | Drought | Every 3-5 Years | Moderate |
| 3 | Cloud Bursts | Regular Feature | High |
| 4 | Earthquake | Regular Feature | Moderate to Very High |
| 5 | Landslides | Regular Feature | High |
| 6 | Avalanches | Regular Feature | Low |
| 7 | Lightening | Rare | Low |
| 8 | Disease Epidemics | Rare | Low |
| 9 | Fire | Regular Feature | High |
| 10 | Hailstorm | Regular | High |
| 11 | Pest attack | Regular | Moderate |

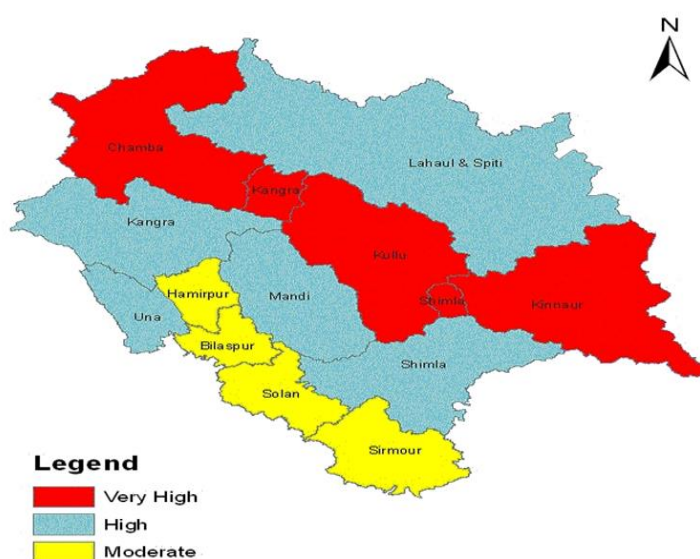
District wise Hazard Threat in Himachal Pradesh

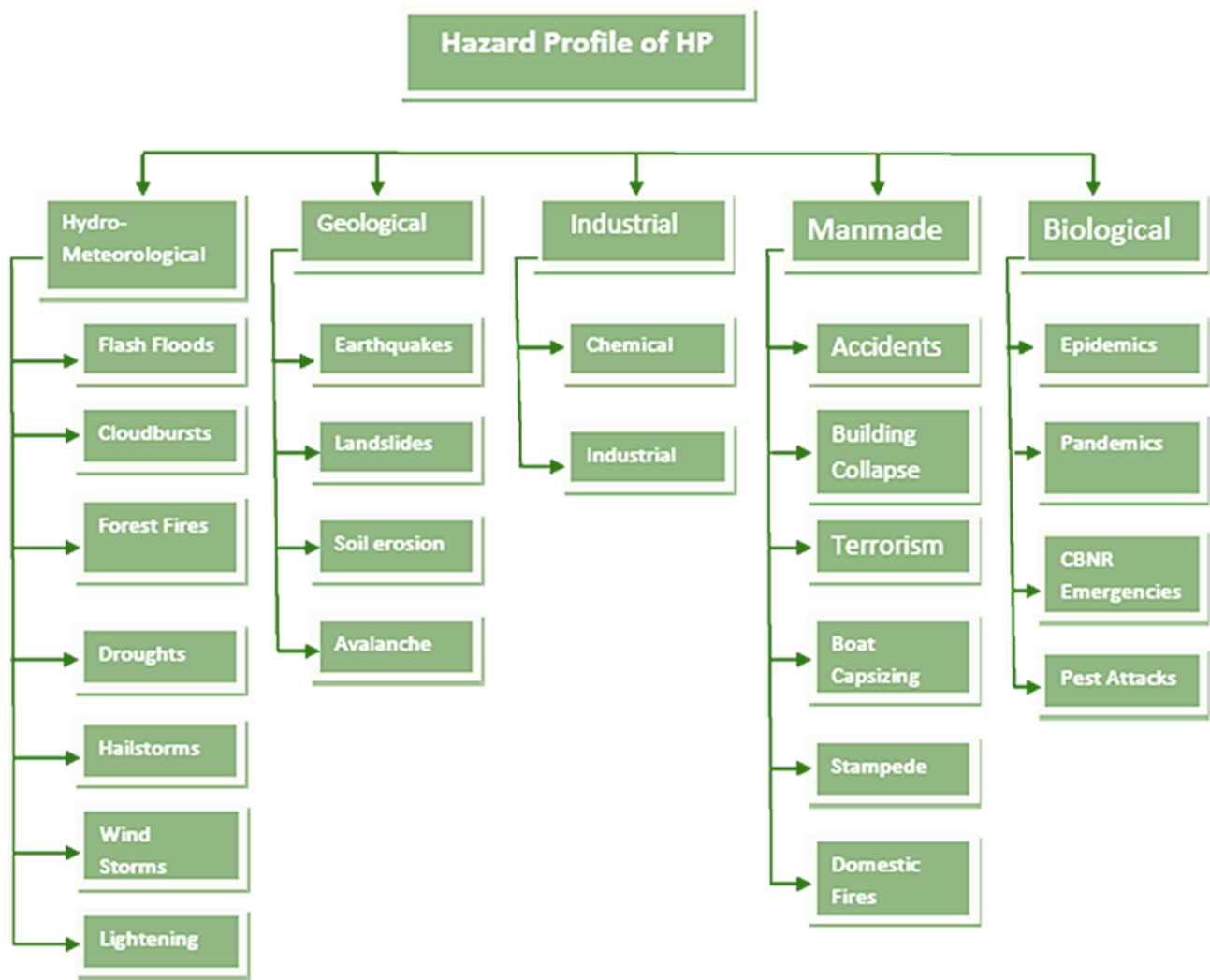
| # | Districts | Earthquake | Landslide | Floods | Avalanche | Forest Fire | Drought | Cloud Burst |
|----|---------------|------------|-----------|--------|-----------|-------------|---------|-------------|
| 1 | Kangra | VH | L | M | M | H | H | M |
| 2 | Chamba | VH | VH | H | M | H | M | H |
| 3 | Hamirpur | H | L | L | - | VH | M | L |
| 4 | Mandi | VH | H | H | - | VH | M | H |
| 5 | Kullu | VH | VH | H | H | H | M | VH |
| 6 | Bilaspur | H | M | L | - | VH | M | L |
| 7 | Una | H | L | H | - | M | M | L |
| 8 | Sirmour | H | L | L | - | VH | M | M |
| 9 | Solan | H | M | L | - | M | M | L |
| 10 | Kinnaur | H | H | H | VH | M | M | VH |
| 11 | Lahaul- Spiti | M | M | M | VH | M | M | H |
| 12 | Shimla | VH | H | H | M | H | M | H |

The districts of Chamba, Kinnaur Kullu and part of Kangra and Shimla fall in very high vulnerable risk. Similarly, districts of Kangra, Mandi, Una, Shimla and Lahaul and Spiti fall in high vulnerable risk status. The district Hamirpur, Bilaspur, Solan and Sirmour falls in moderately vulnerable risk status.

As far as the horticulture department is considered drought, pest attack, hail storms and flash flood are the major hazards which effects the department as well as the entire sector of horticulture per se. Along with the above-mentioned hazard, the assets of the department can also be affected by earthquake and landslides. Therefore, the department should assess the risk of its own assets to.

OVERALL VULNERABILITY MAP-HIMACHAL PRADESH





2.2 ASSESSMENT OF SECTORAL AND DEPARTMENTAL RISKS

The sectoral risks of disasters consist of the risks for the entire sector that the department represents. For example, the horticulture department may assess the potential risks on the total production from the state due to the increasing number of hazards like flash floods or landslides in any specific region. The flash floods, in particular, have increased their frequency at the places situated near the river like in Kullu. The departmental risks of disasters consist of the risks arising out of the exposure of vulnerable departmental assets to the natural or manmade hazards.

Sectoral risk to the horticulture department:

2.2.1 CLIMATE CHANGE

- The PRECIS data on precipitation, maximum and minimum temperature have been analyzed for Himachal Pradesh by TARU. Preliminary inferences on the variations of these entities show that the annual maximum temperature is projected to increase by 1.9°C and annual minimum temperature of 2.3°C towards mid-century. This change in temperature is going to harm the apple produce in the region. Farmers have already started feeling the consequences of the same. The apple producing farmers are shifting their bases to higher heights because the temperature is not suitable for the lower ones now.

- It is also seen from the INRM analysis that cold spell duration indicator is projected to decrease and warm spell duration indicator is projected to increase for all the districts, implying warming up over Himachal Pradesh districts. The warming up of the entire state will further result in a change in cropping patterns too. Floriculture which is being promoted by the department in a very extensive way is going to suffer.
- The increase is projected for average annual rainfall by 15.0% and 28.0% respectively for mid and end century scenarios. Mean monsoon rainfall increases by 182 mm by mid-century and by 384 mm by end century. This huge increase will have a severe impact on the entire sector. Because with an increase in rains there are chances for a hail storm, flash floods affecting the fruit crop, flowers etc.
- It is also projected that heavy and very heavy precipitation day for all the districts in Mid Century and End Century compared to the Base Line are going to increase implying that count of heavy rainy days would increase in the future. Increase in the count of very heavy precipitation days is expected to be the maximum for Salon, Bilaspur and Kangra of Himachal Pradesh districts. These heavy rains will affect the sector further, by affecting the sectorial produce.

2.2.2 DROUGHT

- Himachal Pradesh's cash economy is dominated by horticulture. Due to mountainous situation and domination of marginal and small holdings, cereal crops are grown mostly to meet the self-consumption needs by more than 75% of the households. The results of TARU report show that the once in 10-year rainfall can be significantly lower than the median rainfall. Nearly half the state gets less than 1200 mm of annual median rainfall. Given the high slopes and skeletal soils, the moisture retention is likely to be low and regular and frequent rainfall is required for water-demanding crops.
- The report also indicates that almost all parts of the state except region around Shimla face medium to high drought risks in monsoon rainfall. Shiwalik region of Hamirpur faces summer water shortages due to lack of any perennial sources. Since the soils in Hamirpur and Sandy and shallow, the meteorological droughts can translate into agricultural droughts. In high-risk zone, the once in 10-year drought may be nearly two-third of the median monsoon rainfall, which can cause severe distress to the rain-fed crops and flowers.
- Fruit crops loss estimation done in the report suggest the following:

| Crop | Loss | | | | Normal Production | ID loss as % of Normal Production |
|---------------|------|-----|-----|-----|-------------------|-----------------------------------|
| | 1D | 2D | 3D | 4D | | |
| Apple | 303 | 280 | 248 | 138 | 739 | 41% |
| Mango | 7 | 6 | 5 | 3 | 25 | 29% |
| Lime | 2 | 1 | 1 | 0 | 6 | 30% |
| Citrus fruits | 4 | 3 | 1 | 1 | 13 | 31% |
| Pear | 18 | 16 | 15 | 10 | 35 | 50% |
| Plum | 4 | 3 | 3 | 1 | 16 | 26% |
| All nuts | 1 | 1 | 0 | 0 | 3 | 41% |

Source: Horticultural department data; TARU Analysis 2014

- The financial losses among the fruit are presented as follows:

| Crop | Normal Value | Loss | | | |
|---------------|--------------|-------|-------|-------|-----|
| | | 1D | 2D | 3D | 4D |
| Apple | 3,694 | 1,514 | 1,398 | 1,242 | 689 |
| Mango | 51 | 15 | 12 | 10 | 5 |
| Lime | 27 | 8 | 4 | 2 | 1 |
| Citrus fruits | 59 | 18 | 12 | 6 | 4 |
| Pear | 123 | 62 | 57 | 51 | 37 |
| Plum | 40 | 10 | 9 | 7 | 2 |
| All nuts | 70 | 21 | 16 | 10 | 4 |

Source: Horticultural department data; TARU Analysis 2014

2.2.3 GLACIAL LAKE OUTBURST FLOOD

- The possibility for a GLOF to occur sometime in the future cannot be dismissed, particularly in view of continued atmospheric warming and the associated increase in the volume of glacial lakes. Furthermore, expansion of infrastructure in the vulnerable sectors downstream means that the actual risk associated with an individual event is increasing.
- It has been observed that glacial lake outburst floods have cascading effect on life, livelihood and infrastructure. In the state of HP, the local economy and state gross domestic product (GDP) is highly dependent on horticulture production. This activity is in turn dependent on the glacial ice melt and snowmelt during summers. Changes in the glaciers or resultant GLOF may have an impact on the regional economy.

2.2.4 RIVERINE FLOODING

- The amount of flooding is a function of the amount of precipitation in an area, the amount of time it takes for rainfall to accumulate, previous saturation of local soils, and the terrain around the river system. The TARU study about the riverine flood shows that about 59 villages in Beas basin and 280 villages in Sutlej basin are potentially at risk due to inundation caused by river flooding.

The risk to Assets / Infrastructure of Horticulture Department:

The assets of Horticulture department include the following infrastructure:

| # | Assets / infrastructure | Hazard | Likely impact | Nos |
|---|----------------------------------------------------------------|------------------------------|--------------------------------------------------------------|-----|
| 1 | Directorate of Horticulture | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database | 1 |
| 2 | Fruit Nurseries and Progeny Cum Demonstration Orchards (PCDOs) | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of plants. | 94 |
| 3 | Fruit Canning Units | Earthquake, Landslide, Flood | Partial or complete damage to the building. | 8 |
| 4 | Model Floriculture Centre | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database | 2 |

| | | | | |
|----|-----------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------|-----|
| 5 | Tissue culture laboratory | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database of research. | 2 |
| 6 | Departmental Floriculture Nurseries | Earthquake, Landslide, Flood | Partial or complete damage to the building. | 7 |
| 7 | Departmental Fruit Plant Nutrition laboratories | Earthquake, Landslide, Flood | Partial or complete damage to the building. | 4 |
| 8 | Mushroom Compost production Units (Govt. Sector) | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of material required in mushroom production | 4 |
| 9 | District level office of the of Deputy Director of Horticulture (DDH) | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database. | 12 |
| 10 | Block level offices of Horticulture Dev. Officers (HDOs) | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database. | 77 |
| 11 | Office of Bee Keeping Dev. Officers (BKDO) | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database. | 2 |
| 12 | Horticulture Extension Centers / Plant Protection Centers | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database. | 354 |
| 13 | BioControl Lab | Earthquake, Landslide, Flood | Partial or complete damage to the building, loss of database. | 1 |

Other than the above-mentioned information all the administrative related setups have their own buildings. As informed by the department, many buildings lie in different hazard-prone areas of earthquake and are also prone to fire but any kind of safety audit/ risk audit or retrofitting per se has never been done. But once in a while, unexpected visits are made by the senior officials to assess the maintenance level of the assets. Also at directorate level, Senior Officers are assigned duties to check whether the night watchman has unplugged all the electric connection etc. in all departmental buildings or not. One year calendar of duty chart of these officers is made by the department.

The fund which is allotted every year for maintenance is not enough to maintain the large number of assets the department possess, making these assets even more vulnerable. The risk which these assets of the department have during the time of a disaster is to be considered by the department itself should try to get ready for disaster with the help of various mitigation strategies. Further, Department like that of Horticulture should assess the potential risks of disasters due to emerging issues like climate change.

2.3 ASSESSMENT OF CAPACITY GAPS AND NEEDS

The department should also make a critical assessment of their capacity for disaster risk management before, during and after disasters. After having a discussion with the department, certain gaps were identified in the existing capacity:

- The department is having almost 30 percent vacant post, which is not being filled because of the lack of available fund. This affects the working capacity of the department. With more human resource being deployed within the department, the overall capacity of the department can be increased.
- The exact and accurate data with regard to Hazard, vulnerability and risk profiles (HRVA) of various hazards affecting horticulture crops in various parts of the State is not known. Hence it is very difficult to launch effective mitigation plan for the same.
- The early warning system especially for a hail storm, cloudburst etc. is not available at present in the state.
- The funds under the calamity relief funds (CRF) are not adequate and not made available for mitigation immediately, as they are done after the occurrence of a calamity.

2.4 ASSESSMENT OF PROBABLE DAMAGE AND LOSS

The Departments provided with details of actual damage and loss suffered by the sector and by the department due to disasters in the past. This will give good ideas about the pattern and trend of such losses in the past, based on which projections can be made of future losses. A lot of damage has occurred to fruit crops due to natural calamities in Himachal Pradesh. The details are given in the table below:

Damage to fruit crops during the last five years

| # | Year | Kind of natural calamity | Area Affected (Hect.) | Value of crops damaged (Rs. in lakh) |
|---|---------|-------------------------------------------------|-----------------------|--------------------------------------|
| 1 | 2008-09 | Heavy rains and cloudburst | 12,988 | 20460.00 |
| 2 | 2009-10 | Drought, Hail Storm, Excessive Rains | 32244 | 24834.25 |
| 3 | 2010-11 | Drought, Hail Storm, Excessive Rains, Windstorm | 106467 | 23640.99 |
| 4 | 2011-12 | Hail Storm, Heavy Rains & Wind Storm | 166207 | 35695.24 |
| 5 | 2012-13 | Hail Storm, Heavy Rains & Wind Storm | 68812 | 32046.00 |
| 6 | 2013-14 | Heavy snowfall, Hailstorm, Heavy Rains | 55593 | 48490.00 |

Horticultural crops area (hectares) affected due to various disasters

| # | District | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 |
|---|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1 | BILASPUR | 0 | 896 | 3527 | 0 | 463 | 0 | 1225 | 270 |
| 2 | CHAMBA | 349 | 4775 | 2650 | 7838 | 0 | 0 | 0 | 4296 |

| | | | | | | | | | |
|----|----------|-------|-------|-------|-------|-------|-------|-------|--------|
| 3 | HAMIRPUR | 742 | 1091 | 95 | 831 | 824 | 897 | 1635 | 1063 |
| 4 | KANGRA | 6867 | 3237 | 4885 | 9124 | 0 | 4741 | 290 | 123745 |
| 5 | KINNAUR | 3196 | 812 | 0 | 120 | 0 | 11668 | 10274 | 187 |
| 6 | KULLU | 2485 | 1198 | 150 | 180 | 3875 | 19300 | 21300 | 5639 |
| 7 | L&S | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 43 |
| 8 | MANDI | 2162 | 4884 | 2573 | 5976 | 19400 | 13200 | 10036 | 8120 |
| 9 | SHIMLA | 2605 | 23563 | 3500 | 26019 | 25322 | 332 | 15119 | 8874 |
| 10 | SIRMOUR | 1 | 6 | 1468 | 1393 | 551 | 0 | 1 | 0 |
| 11 | SOLAN | 800 | 9956 | 13741 | 116 | 415 | 0 | 188 | 946 |
| 12 | UNA | 1850 | 3020 | 3036 | 2880 | 3036 | 0 | 600 | 1606 |
| HP | | 21057 | 53437 | 35625 | 54476 | 53886 | 50139 | 60676 | 154788 |

Loss of Horticulture production (in Tons) due to various disasters

| # | District | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 |
|----|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1 | BILASPUR | 0 | 1664 | 1985 | 0 | 935 | 0 | 535 | 1866 |
| 2 | CHAMBA | 6313 | 76240 | 42250 | 119399 | 0 | 0 | 0 | 3936 |
| 3 | HAMIRPUR | 1555 | 1199 | 50 | 2657 | 886 | 775 | 819 | 453 |
| 4 | KANGRA | 2642 | 2098 | 6454 | 10684 | 0 | 7485 | 180 | 109651 |
| 5 | KINNAUR | 15705 | 2500 | 0 | 1000 | 0 | 6000 | 3400 | 11 |
| 6 | KULLU | 517 | 65644 | 30000 | 30000 | 82675 | 27000 | 38800 | 9511 |
| 7 | L&S | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 7 |
| 8 | MANDI | 0 | 0 | 0 | 0 | 39710 | 31317 | 23127 | 4781 |
| 9 | SHIMLA | 23446 | 165313 | 57000 | 202159 | 147737 | 17 | 95509 | 32516 |
| 10 | SIRMOUR | 4 | 54 | 2395 | 2462 | 0 | 0 | 0 | |
| 11 | SOLAN | 200 | 1096 | 3184 | 520 | 348 | 0 | 210 | 819 |
| 12 | UNA | 1250 | 6000 | 9494 | 3244 | 9494 | 0 | 1770 | 10756 |
| HP | | 51632 | 321808 | 152812 | 372125 | 281785 | 72594 | 164420 | 174306 |

The above data shows that the sector has been affected by hazards severely. The department, therefore, should come up with mitigation plans which can help in at least minimizing the impact of a hazard on the department as well as the sector.

3. RISK PREVENTION AND MITIGATION

3.1 RISK PREVENTION

Risk prevention is preventing the creation of new risks of disasters. Such risks may be created unwillingly by the Departments directly through public investments or indirectly through the facilitation of private investments that are vulnerable to the risks of disasters. Therefore, every investment should go through HRVA to check if new programmes, activities or projects have the potential to create new risks of disasters. If such investments cannot be avoided these must be protected by safeguards through adequate structural and non-structural prevention measures so that the benefits of investments are fully protected from risks of disasters. For example, assets of the horticulture department like offices, equipment's and others should be located at places which have lesser chances of getting affected by a hazardous event. The main idea here is what the department can do within its mandate to increase the idea of risk prevention.

Certain method which can be implemented for risk prevention are:

- The department should be risk sensitive while implementing any project in future. Although the idea of risk sensitivity already exists in the department. For example, the department promotes drip irrigation in areas which are expected to have fewer rains.
- Proper implementation of the government schemes and programs can also reduce the risks. The production of the farmers can be increased through various schemes of the department like those related to providing seeds, fertilizers and anti-hail guns etc. thus making the community more resilient to face a disaster situation.
- Establish clear and measurable objectives for seismic safety that can be implemented and supported by the community with the timeline.
- Establish programmes as long-term undertakings with a strong commitment to sustained effort rather than one-time action.
- Adopt a multi-hazard approach to safety with earthquake mitigation strategies that complement and enhance disaster countermeasures for other hazards.
- The department should consider Disaster impact assessment while doing the Environment Impact assessment.
- The idea of climate change adaptation is to be kept in mind at the time of implementation of a new project.

3.2 RISK MITIGATION

Risk mitigation is reducing the risks of disasters that are already there due to exposure of vulnerabilities to the hazards. Mitigation projects reduce the level of exposures or the depth of vulnerabilities or both through a combination of various structural and non-structural measures. Mitigation projects are always costly and therefore these have to be planned with proper Cost Benefit Analysis (CBA) to ensure that the benefits of the projects outweigh the costs.

The primary objective of mitigation efforts would be:

- To identify, delineate and assess the existing and potential risks and to work towards reducing potential causalities and damage from disasters.

- To substantially increase public awareness of disaster risk to ensure a safer environment for communities to live and work.
- To reduce the risks of loss of life, infrastructure, economic costs, and destruction that result from disasters.

In view of the prevailing risk and the vulnerabilities perception, the mitigation measures proposed have been categorized under following five major groups:

- **Risk assessment:** Risk information should be provided to the farmers on time and for that, a proper risk assessment should be done by the department.
- **Construction work:** All the newly constructed assets should follow the building by-laws of the state.
- **Repair and maintenance:** Retrofitting and renovation of the lifeline buildings should be done by the department.
- **Research and technology transfer:** The department should identify and interact with research institutions to evolve mitigation strategies both structural and non-structural.
- **Training and capacity building:** Training programs about the awareness of disaster with respect to horticulture can be planned at the village level.
- **Communication arrangements:** A free helpline can be made by the department which can guide the farmers on how to use various mitigation measures to fight against a disaster situation.

3.3 MATRIX OF HAZARD-SPECIFIC MITIGATION MEASURES

| HAZARD | MITIGATION MEASURES (STRUCTURAL AND NON-STRUCTURAL) |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Earthquake | <ul style="list-style-type: none"> • Revision and adoption of model building bye-laws for construction of departmental assets both in the urban and rural area. • Undertaking mandatory technical audits of structural designs of major projects by the competent authorities. • Assessing the seismic risk and vulnerability of the existing built environment by carrying out structural safety audits of all critical structures. • Undertaking seismic strengthening and retrofitting of critical structures, initially as pilot projects and then extending the exercise to the other structures. • Developing appropriate risk transfer instruments by collaborating with insurance companies and financial institutions. |
| Drought | <ul style="list-style-type: none"> • To create water harvesting & storage structure. Run-off water harvesting or excess rainwater of the area as per slope may be collected in ponds of appropriate sizes. Recycling this stored water will help to guard against water deficit at critical stages. • To install tube/bore well /drip irrigation/ sprinkler system. The drip system of irrigation supplies water to the root zone. This method avoids loss of moisture by evaporation and gravitation. Drip irrigation system is getting importance for efficient utilization of water. • To adopt moisture conservation methods e.g. plastic and dry grasses as mulch to conserve soil moisture. Mulching the tree basin with a waste organic material such as grasses, paddy straw, etc. prevents the loss of moisture by evaporation. This also |

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|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>prevents weed growth, maintains optimum temperature and improves the organic matter content of the soil.</p> <ul style="list-style-type: none"> • A spray of Boric acid (0.1 %) and calcium chloride (0.5%) in 100 litres of water for drought-induced deficiency of Boron and Calcium element in the affected orchards. • To plant, drought tolerant varieties of different fruits like Gola, Banarsi Karaka, Excel Condria, MM-111 apple rootstock. • Awareness will be brought among the farmers on drought regulations and enforcement. |
| Hailstorm | <ul style="list-style-type: none"> • Installation of anti-hail nets. • Installation of the anti-hail gun. • The horticulture department at district level shall prepare a plan to take preventive action /measures to lessen the impact of hailstorm and prevent such occurrence. • Such plan shall be prepared blockwise. • Necessary measures shall be taken for mitigation the impact of such incident. |
| Flash floods / Cloudburst | <ul style="list-style-type: none"> • Along with DDMA, the department should demarcate the flood-prone area and no construction related to the department should be done there. • Plantation of orchards on contours. The contours should be prepared across the slope. This practice will reduce the washing away of top soil and nutrients, this will further increase the water infiltration deeper into the soil profile and root zone of the fully-grown trees. • The excess moisture causes infection of Apple Scab; Pre-mature leaf falls etc. in the shady portion of the orchards. The spray schedule for control of various diseases in fruit crops is prepared by the department every year, which is circulated amongst the orchardist every year for follow up of the control measures as suggested in it. • Mitigation plan should be in place to safeguard the farmers/ inhabitants from the flash flood. |
| Pest attack | <ul style="list-style-type: none"> • The department should provide pesticides to the farmers well in advance and also should maintain a certain amount of stock for an emergency. |
| Frost | <ul style="list-style-type: none"> • To use bio-fertilizers and organic manures for improvement of soil health, moisture retention ability etc. • To identify frost prone areas where frost occurs during winter. • To plant frost tolerant species. • To select site free from frost for plantation. • To provide surface irrigation facilities. • To install overhead sprinklers. • To install fogger and apply smoke in the orchards. • A spray of Petroleum distillate, ZnCl₂, NH₄Cl, mineral oils, glycol. • To organize training camps to minimize the loss due to frost. |

4. MAINSTREAMING DISASTER RISK REDUCTION IN DEVELOPMENT

Disaster Management Act has stipulated that DM Plans of the Departments of State Government shall integrate strategies for prevention and mitigation of the risks of disasters with the development plans and programmes of the department. Mainstreaming disaster management into the development planning process essentially means looking critically at each activity that is being planned, not only from the perspective of reducing the disaster vulnerability of that activity but also from the perspective of minimizing that activity's potential contribution to the hazard.

Every development plan in the state would require incorporating elements of impact assessment, risk reduction, and adoption the 'do no harm' approach. The linkage of DRR in Development has the following three purposes to achieve:

- To make the future environment free from construction risk.
- To utilize the funds of the government to mitigate the vulnerability to any disaster, thus progressing towards physical, socio-economic and environmental vulnerability free era.
- To make sure that all the govt. plans should be integrated with disaster risk reduction programmes by integrating such elements in these plans so that disaster risk-free environment can be created.

Although there are several schemes within the department of horticulture advocating disaster management measures, out of which some of them are as follows:

| # | Name of Scheme | Key Component of the scheme | Key activities for mainstreaming |
|---|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1 | Horticulture Development Scheme | <ul style="list-style-type: none"> • Supply of Fruit Plants and elite plant material from registered Govt. and Private nurseries • Supply of horticulture inputs. • Establishment of new orchard (individually or as garden colony) • Incentives and Subsidy: <ul style="list-style-type: none"> ○ Establishment of individual orchard: 50% to SC / ST / IRDP, 25% to Small farmers, 33.33% to Marginal farmers maximum limit-Rs. 3000/- ○ Establishment of garden colony: Combined Fencing, Plant Protection equipment, Irrigation facility-75% to S/C, 50% to Small / marginal and backward area farmer Land development, Plantation, ○ Other orchard management operations: 50% to S/C and backward area farmer, 25% to small farmer, 33.3% to marginal farmer and nil to other farmers. Maximum limit-Rs.18000 (for 2 ha.), Rs. 36000 (for 4 ha.). | <ul style="list-style-type: none"> • Crop insurance can be provided to the farmers. |

| | | | |
|---|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | Hops cultivation Services | <ul style="list-style-type: none"> ● Advanced training in hop cultivation ● Supply of Plant material and other inputs ● Incentives and subsidy: <ul style="list-style-type: none"> ○ Support price for procurement of dried hops fixed by Government from year to year. But a 50% subsidy is provided for the same | <ul style="list-style-type: none"> ● While providing the training on hop cultivation, the farmers can be introduced to the idea of DRR and how can it affect them. |
| 3 | Plant Protection Services | <ul style="list-style-type: none"> ● Supply of pesticides and plant protection equipment ● Release of bioagents in farmers' fields ● Incentives and Subsidy: 50% to small / marginal farmers and 30% to Big farmers | <ul style="list-style-type: none"> ● Adequate provision of funds under the scheme for purchase and distribution of pesticides and micronutrients |
| 4 | Horticulture Farms & Nurseries Services | <ul style="list-style-type: none"> ● Serve as Model demonstration centres for modern horticulture technology ● Production of elite plant material at Government registered nurseries ● Incentives and Subsidy: Free Demonstration | <ul style="list-style-type: none"> ● These farms and nurseries can help in providing information about the variety of plant which can sustain specific hazards. |
| 5 | Horticulture Training & Extension Services | <ul style="list-style-type: none"> ● Training of Farmers through short-term training camps and training courses ● Exposure visits of farmers within and outside the state. ● Organization of seminars and workshops ● Incentives and subsidy: <ul style="list-style-type: none"> ○ Panchayat level training: Rs. 100.00 / day / farmer ○ Block / Distt. Level training: Rs. 200 / day / farmer ○ State level training: Rs. 250 / day / farmer | <ul style="list-style-type: none"> ● These training services can act as a platform to create awareness of disaster management among the farming community. |
| 6 | Development of Beekeeping Services | <ul style="list-style-type: none"> ● Supply of improved strains of bee colonies with hives to interested farmers. ● Supply of bee colonies for pollination to orchardists on a rental basis. ● Incentives and Subsidy <ul style="list-style-type: none"> ○ 5-day practical Training in Bee Keeping: Rs. 250 per day per farmer | <ul style="list-style-type: none"> ● Promotion of a new idea of livelihood generation can help in building the resilience capacity of the community |
| 7 | Development of Floriculture Services | <ul style="list-style-type: none"> ● Supply of elite planting material. ● 5-day practical Training. ● Incentives and subsidy: <ul style="list-style-type: none"> ○ 5-day practical Training in Floriculture: Rs. 250 per day per farmer | <ul style="list-style-type: none"> ● Training on Disaster management to be provided to the farmers |

| | | | |
|---|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <ul style="list-style-type: none"> ○ Supply of plant material, seeds, fertilizers, pesticides, equipment on 25% to small farmers and 33% to marginal farmers. | <ul style="list-style-type: none"> ● Capacity building of the farmers to be done |
| 8 | Fruit Processing Programme Services | <ul style="list-style-type: none"> ● Community Canning Service. ● Processing of fruits and vegetables ● Incentives and subsidy <ul style="list-style-type: none"> ○ 1 days Training in Home scale preservation of Fruits and vegetables. ○ Processing of Fruit products under community canning service on nominal rates. ○ 1-day practical training in Home scale preservation of Fruits and vegetables: Rs. 250.00 per day per farmer. | <ul style="list-style-type: none"> ● The processed food can be provided as relief material in a post-disaster situation. The community, during the home scale preservation training, can be informed that how the very preserved food can be helpful in a post-disaster situation. |
| 9 | Mission for Integrated Development of Horticulture (MIDH) | <ul style="list-style-type: none"> ● It is a Centrally Sponsored Scheme for the holistic growth of the horticulture sector covering fruits, vegetables, mushrooms, spices, flowers, aromatic plants etc. ● Main objectives of the Mission are: <ul style="list-style-type: none"> ○ Promote holistic growth of horticulture sector, which includes research, technology promotion, extension, post-harvest management, processing and marketing, in consonance with comparative advantage of each region and its diverse agro-climatic features; ○ Encourage aggregation of farmers into farmer cluster groups to bring the economy of scale and scope. ○ Enhance horticulture production, augment farmers, income and strengthen nutritional security; ○ Improve productivity by way of quality germplasm, planting material and water and nutrients use efficiency through Micro Irrigation. ○ Support skill development and create employment generation opportunities for rural youth in horticulture and post-harvest management, especially in the cold chain sector. | <ul style="list-style-type: none"> ● Adequate provision of funds under the scheme for the farmers to mitigate the losses. ● Installation of Anti frost control techniques i.e. micro-irrigation techniques in the frost-prone areas with the funds of MIDH |

5. DISASTER PREPAREDNESS

Disaster preparedness has been defined as “the state of readiness to deal with a threatening disaster situation or disaster and the effects thereof”. The Department may review their “state of readiness” and prepare a strategic action plan to deal with possible disaster situations. The department already has maintained certain level of preparedness, for example, the department provides anti-hail nets to the apple growers on subsidized rates to protect their produce from a hail storm.

| # | Preparedness Measures | Action Taken / Remarks |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 1 | Designate one Liaison Officer in the department and the district as the Disaster Management Focal Point. | |
| 2 | Develop a state disaster management plan for the department | |
| 3 | District specific disaster management plan has to be prepared by ADH / DDH based on vulnerability and submitted to the district administration. | |
| 4 | Encourage disaster resistant technological practices in buildings and infrastructure. | |
| 5 | Geotagging of all the assets can be done to assess the post-disaster losses if any | |
| 6 | Formation of EOC and incident response team should be done beforehand. | |
| 7 | Secondary database management plan for important documents. | |
| 8 | Evacuation plan for the building to be made. | |
| 9 | Awareness about the preparedness of the disaster should be given to all the employees of the department not only the nodal officer. | |
| 10 | Check the availability of fruit plants and disseminate information about the outlets where horticulture inputs can be made available. | |
| 11 | Set up a public information centre for providing information regarding horticultural inputs, technical guidance / advisory services, and control of pest/revival of damaged plants. | |
| 12 | Prepare a schedule for a spray of pesticides and micronutrients after the disaster. | |
| 13 | Procure Hazard Risk and Vulnerability (HRV) analysis for the State and Identify most vulnerable areas. | |
| 14 | Identify areas likely to be affected. | |
| 15 | Arrange for keeping stock of planting materials, micronutrients and pesticides. | |

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|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 16 | The entire value chain of the food processing industry can be considered and a certain amount of safety of the product can be made through cold storages in safer areas. | |
| 17 | Check available stocks of equipment and materials which are likely to be most needed during disasters like floods and droughts | |
| 18 | Determine the type of damage, pests or disease may cause horticultural crops and identify the insecticides required for the purpose, in addition to requirement of setting up extension teams for crop protection and accordingly ensure that extra supplies and materials, be obtained quickly | |
| 19 | All valuable equipment's and instruments should be packed in protective coverings and stored in the room the most damage-proof. | |
| 20 | Suggest kind and varieties of horticultural crops and methods, which can reduce losses and reduce the risks to farmers. | |
| 21 | Ensure that required horticultural inputs are available in adequate quantities. | |
| 22 | Develop a pest and disease monitoring system so that timely steps can be taken to reduce damage to crops. | |
| 23 | Provide information to all concerned, about disasters, likely damages to crops and plantations, and information about ways to protect the same. | |
| 24 | All electrical equipments should be unplugged when disaster warning is received and especially in flood-prone areas. | |
| 25 | The officials within the department can be trained on certain aspects of disaster management which can help in increasing awareness about the subject | |
| 26 | Coordination among inter-departmental personnel at district and block level. | |

6. DISASTER RESPONSE, RECOVERY AND REHABILITATION

6.1 RESPONSE PLAN

The response plan of the Department includes the design of actions based on Standard Operating Procedures and tested through mock drills and exercises that would be initiated on a trigger mechanism based upon the impending or actual occurrence of an event of a disaster. Many Departments and agencies of the State Governments will be required to perform important functions relating to relief and rehabilitation. The response plan of the Department should provide detail with the logistic, financial and administrative support necessary for discharging these functions and the manner in which these functions shall be discharged. Following are the roles and responsibilities of the Horticulture Department:

Trigger Mechanism for Response:

- The nodal officer for disaster management in the department shall be responsible for coordination with EOC, ESF nodal and support agencies and other departments. Appoint additional staff to support him as required for the situation.
- Develop periodic situation report and share with EOC and SDMA.
- If EOC at district level declares it as an emergency situation and Response plan is activated, disseminate the information to all staff, key stakeholders etc.
- Call for a coordination meeting of the key officer to take stock of the situation, the impact of the disaster on department capacity, immediate actions for a response like need and damage assessments, coordination with ESF and Incident response system / EOC, coordination with community-level committees and other key stakeholders.
- To undertake need & damage assessment with respect to all types of horticulture crops.
- Monitor damage to crops and identify steps for early recovery.
- To ensure the uninterrupted functioning of all infrastructures related to Horticulture sector.
- To assist the farming community in restoration & relocation efforts.
- Organize transport, storage and distribution of the above with adequate record keeping procedures.
- Ensure that adequate conditions for cleaning operations are maintained to avoid water-logging and salinity.
- Print and widely distribute the list of points where certified planting materials are available along with names of varieties and rates. Notices may be affixed at public places, Plant Health Clinics (PHCs), Block headquarters, Tehsils etc.
- Recall important functionaries from leave, communicate to all the staff to man their places of duties.
- Call for an emergency meeting to take stock of the situation. Develop a strategy and objectives.
- Establishment information centres and extension network and assist in providing an organized source of information.
- Organize distribution of planting materials, pesticides, horticulture inputs and implements to the affected people.

Response plan on receipt of early warning

The activity required are:

- To direct the officers of all levels in the department, for high-level preparedness to ensure the safety of buildings of all govt. departments and other assets.
- To appoint one communication officer to coordinate with the emergency control room of the disaster management department.
- To direct the officers of all level in the department to provide support and regular help to the subdivision officers, district magistrate, disaster management agencies and other local administration.
- Informing the relevant offices and people about dos and don'ts in case the disaster happens.
- Support in the dissemination of Early Warning information once approved by SDMA.
- Informing and calling the SDRF

| Name of Hazard | Checklist of Action / Roles and responsibility of department |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. Slow-Onset type of Disaster | |
| Drought | <ul style="list-style-type: none"> • To assess the damage caused to the fruit crops in affected areas. • To undertake relief measures in drought-affected areas. |
| Frost | <ul style="list-style-type: none"> • To assess the damage caused to the fruit crops in affected areas. • To prune the affected/damaged parts of the plants. • To apply fungicidal paint/paste on the cut ends. • To give a cover spray of fungicides on the affected plantations immediately. • To apply micronutrients to rejuvenate the affected parts of the plants and encourage fresh growth. |
| Disease / Epidemics | <ul style="list-style-type: none"> • To assess the damage caused to the fruit crops in affected areas. • To arrange the supply of pesticides to the affected areas to treat the disease affected orchards. |
| B. Fast Onset type of Disaster | |
| Hail Storm | <ul style="list-style-type: none"> • To assess the damage caused to the fruit crops in affected areas. • To arrange the supply of pesticides to the affected areas to treat the hail affected fruits and fruit trees. • Recommendation against hail damage: - <ul style="list-style-type: none"> ○ Boric Acid (200gm) + Zinc Sulphate (500 gm) + Quick Lime (250 gm) + Mancozeb (600gm) in 200 litres of water, spray after hail storm after 3-4 days. ○ Spray the hail affected apple orchards with urea (1Kg) in 200 litres of water as first spray and micronutrients like Agromin, Multiplex or Microvit @ 400 to 600 gm / 200 litres of water. |
| Cloud Burst | <ul style="list-style-type: none"> • To assess the damage caused to the orchards and quantum of fruit trees washed away by cloudburst • To arrange the supply of fruit plants to the farmers affected by flash floods. |

| | |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> • To prune the affected/damaged parts of the plants. • To apply fungicidal paint/paste on the cut ends or damaged branches. • To apply micronutrients to rejuvenate the affected parts of the plants and encourage fresh growth |
| Excessive Rain | To assess the damage caused to the fruit crops in affected areas. |
| Heavy Snow | <ul style="list-style-type: none"> • To assess the damage caused to the fruit crops in affected areas. • To arrange the supply of pesticides to the farmers to treat the affected orchards. |

6.2 DISASTER RELIEF AND REHABILITATION:

Following steps can be taken by the department of horticulture in a post-disaster situation:

- Quantify the loss and damage within the quickest possible time and finalizes planning of agriculture rehabilitation;
- Ensure availability of adequate supply of seeds, seedlings, fertilizers, pesticides and agricultural implements;
- Assist farmers to re-establish their contacts with agriculture produce market and ensure that appropriate prices be offered to them;
- Estimate the requirement of planting material, pesticides and labours. There are 99 PCDO's in the state which further can be used to provide plant material after the disaster situation.
- Provide information to NGOs and other organization about the initiative and resources of the department;
- Assess the extent of damage to field /soil, horticulture crops, Irrigation systems, Poly /Greenhouses and storage facilities / assets.

7. DISASTER RECOVERY AND RECONSTRUCTION

The process of recovery from small-scale disasters is usually simple. Recovery operations get completed almost simultaneously with the response, relief and rehabilitation. However, in medium and large disasters involving widespread damages to lives, livelihoods, houses and infrastructure, the process of recovery may take considerable time as the relief camps continue till houses are reconstructed. Often intermediary shelters have to be arranged before the permanent settlements are developed. Therefore some of the Emergency Support Functions of recovery of the sector may continue for months. Departmental DM Plans should anticipate eventualities of longer duration recovery operations. The strategy adopted for this as per the emergency functions assigned to the department at the district level and nodal departments will be as below:

- **Short-Term Reconstruction Activities:** This should further include immediate restoration activities like the restoration of the basic infrastructure of the department assets, providing compensation to the farmers under various schemes available within the department mandate.
- **Long-Term Reconstruction Planning:** Once the minimum basic reconstruction is being done the department should take immediate action for long-term recovery of its own sector. For example, if a region is struck by drought, the department should try providing that variety of seed to the farmer which can be grown with less irrigation. The department in this way should try to minimize the vulnerability of the people in its sector.

| # | Name of the agency | Regular duty | Role during disaster situation | Role supposed to be played during | | | |
|----|-----------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| | | | | Emergency response | Relief & Recovery | Prevention | Mitigation |
| 1. | University of Horticulture & Forestry, Nauni, Solan | Research & Education | Extension services | Deployment of Quick Response Team (QRT) to the disaster-affected sites. | To assist the department in quick relief and recovery efforts. | To suggest effective control measures for the control of diseases epidemics etc. | To demonstrate to the farmers the methods of treatment and control measures for the diseases epidemics, frost etc. |
| 2. | Agro Industries Corporation | Manufacturing, Procurement and supply of Agri. / Horticulture based products / inputs. | Supply of pesticides to the dept. at short notice | Deployment of Quick Response Teams for the procurement of Horticulture Inputs. | Prompt supply of pesticides to the affected areas. | - | - |
| 3. | Public Work Department | Maintenance of road and Buildings | To repair the damaged road and highway to help in supply of inputs to the affected sites. | Deployment of Quick Response Teams for the procurement of Horticulture Inputs. | Placement of Department vehicles for delivery of Horticulture inputs to the sites. | To keep the road in good condition | The quick response of the road for delivery of Horticulture inputs like pesticides etc. To the affected sites. |

8. FINANCIAL ARRANGEMENTS

Section 40(2) of the Disaster Management Act stipulates that every department of the State Department while preparing the DM Plan, shall make provisions for financing the activities proposed therein.

Normally the funds required for risk assessment and disaster preparedness must be provided in the budgets of every concerned department. Such funds are not very sizeable and departments should be able to allocate such funds within their normal budgetary allocations. **Here the idea is to come up with a separate disaster management budget head within the budget allocation of the department.** This budget can be used to work upon the already suggested mitigation and preparedness measures, as response and relief are already being taken care of by the SDRF and NDRF.

This budget head can work with a very basic amount initially as the marginal costs involved in mainstreaming DRR in existing programme is not very sizable. Also, the funds required for risk assessments and disaster preparedness are also not very large. This budget will help in institutionalizing the entire process. And once the department starts having a separate budget for prevention and mitigation, at least some measures will start automatically.

The department told that they can have a budget head of **5-10 lac** in the disaster management budget head initially which can at least help in starting the mainstreaming process within the system.

