

MOBILIZATION AND MANAGEMENT OF RESOURCES

FOR

HORTICULTURE DEVELOPMENT IN NEPAL

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ABSTRACT

Agro-climate, flora-genetlies, human potency and the financial allocates are the flour major competent resources, which could have been mobilized and managed judicially, for the development of horticulture in Nepal. Despite the fact that the country has tremendous potentials for horticulture development, nothing tangible and substantial development could occur as the potentials largely remained untapped, mismanaged and miserred.

Though, in the past some strategic policies and priorities were committed by HMG but not implemented appropriately and adequetly. Without understanding the cause and effect of the actions properly, some projects were implemented to intervene the horticultural practices which proved fruitless and ended with minimal effect on sustainability and continuity.

Appropriate utilization of natural resources, efficient mobilization of human resources and judicial allocation of financial resources for horticultural development could lead the country in the path of progress and prosperity.

INTRODUCTION

Nepal is bestowed by nature with equitable soil and vivid agro-climate condition on her space geometry and boundless undugged precious mineral and metalie wealth underneath. Despite, it is said that Nepal is a rich country inhabited by the poors. Nepal is entering into twenty first Century with predominant dependency on primitive agriculture of subsistence nature.

Though, the agriculture system is traditional with feudal economy in the rural Nepal, it contributes about 41 percent to the gross domestic product (GDP) and produces a large percent of the exports. The major agricultural export is contributed by horticulture sub-sector which includes fruits, vegetables, vegetable seeds, spices and flowers (NPC,1995). This important sub-sector which directly can help in alleviating rural poverty, improving ecological and environmental degradation, coping with the nationwide problems of malnutrition permanently and can raise the standard and quality of life and livelihood through increased income, has been neglected sub-sided, and marginalized. As a result the termendous natural resources remained untapped and

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under utilized. Well trained potential human resources remained frustrated, misguided and misutilized. Consequently, miserly allocated financial resources also remained under utilized. All these factors contributed to the morbid development of horticulture in Nepal.

PHYSICAL SETTING

The kingdom of Nepal is a land locked (rather India locked) mountainous country located between China in the north and India other three sides. Being sandwiched between China and India, Nepal is said to be a buffer state. The country is almost rectangular in shape and enclosed between $36^{\circ} 22''$ to $30^{\circ} 17''$ north latitude and $80^{\circ} 4''$ to $88^{\circ} 12''$ east longitude. The east west length is about 885 km and north south width varies from 130 to 240 km. The total land area is approximately 147,181 sq. km out of which 29,590 sq. KM (20.1%) is under cultivation.

Physiographic regions : The physiography of Nepal is mainly determined by altitude which varies from 58 m. in the southern Terai to 8848 m. the highest peak of the world, Mount Everest the north. The country is divided into five physiographic regions.

Terai plain: including inner Terai (Dun) altitude ranging between 58 to 330 m and constitute 23% of the total area of Nepal (Shrestha, 1989)

Siwalik churia range: including southern hills and interior valleys altitude ranging 200 m to 1500 m.

Mid-hills: including zone of hills, valleys, river basins and elevated flat lands (tars).

High hills: northern hills and Mahabharat range and sub-Himalayan region altitude varying from 1000 m to 5000 m.

Himalaya: Various Himalayan ranges including more than 200 peaks above 6000 m and 13 peaks above 8000 m. The snow covered area is estimated about 15 percent of the total area of Nepal. Including the sub-Himalayan area of above 3000 m, this region represents approximately 27 percent of the total forest area of Nepal.

The major portion of Nepal (50-62%) is represented by low hills, mid hills including valleys, basins, tars and high hills.

Natural resources: Within the given space geometry and physiography of Nepal the natural resources for agriculture specially for horticulture development in Nepal include agro-climate, soil, water and agro-genetic variability.

Agro-climatic resources: **Altitude and topography are the guiding factor of the agro-climatic conditions of a particular area in Nepal. Temperature and rainfall is influenced by altitude, facing and leewarding by high mountains in the cultivated area. In Nepal horticultural crop cultivation is done up-to the altitude of 4000 m or even higher up in certain areas.**

Latitudinally Nepal occupies the space on the temperate zone of the earth in the northern hemisphere in the monsoon belt of Indian ocean, Arabian sea and the bay of Bengal.

Due to these situations the temperature in the cultivated area may go as low as -9°C during winter months (December-January) in the high hills to as high as 41°C during summer month (May-June) in Terai. The annual average rain fall varies from 250 mm (Mustang) to 2800 mm in eastern mountains and pokhara. The major portion of precipitation (80%) is received during June to September (i.e. monsoon). The western wind from Mediterranean sea brings some amount of precipitation during winter March

to May is the hot and dry. Due to such peculiar conditions Nepal can be divided into the following five agro-climatic resource zones:

Sub-tropical zone: The sub-tropical zone extends from east to west in all terai flat-plain area inner terai, Siwalik and some parts of low basins in the lower mid-hills. It covers about 60 percent of the cultivated land. The elevation ranges from 58 m to 600 m above msl. The temperature fluctuates between 7^o C to 24^o C during December-January and 24^o C to 41^o C during June-July and the annual average fluctuates between 20^o C to 24^o C. The annual rainfall varies from 1300 mm in the eastern to 600 mm in the western parts. The eastern part is relatively hot and humid and the western part is hot and dry.

Mango, banana, pineapple, litchi, jackfruit, grapes, guava and other tropical fruits can successfully be grown in this belt. In addition, the eastern part is suitable for coconut and aricanut.

Most vegetable corps and potatoes grow well during different seasons in the sub-tropical area of Nepal including seeds of cucurbits, legumes and solanaceous crops.

Warm temperate zone: This zone is a wide belt running from east to west in the middle part of Nepal. The elevation ranges from 600 m to 1500 m above msl. The warm temperate climate prevails in the river basins, low hills, flat tars and in the basal area of Mahabharat ranges. The average daily temperature fluctuates between 10^o C to 15^o C during December- January and between 25^o C to 30^o C during June-July and the mean annual temperature fluctuates between 17^o C-25^o C. The annual rain fall varies from 2800 mm in the eastern part to 1000 mm in the western part. This zone has warm, humid long summers. This climatic region has wonderful potentials for citrus, guava, papaya, litchi, plum, pear, banana, and many other fruits and most kind of vegetables and spices.

Cool temperate zone: The cool temperate zone extends from east to west between the elevations ranging 1500 m to 3000 m above msl. The upper mid-hills high hills of Mahabharat range and basal area of Himalaya constitute the cool temperate zone. The mean daily temperature during winter fluctuates between 5^o C to 10^o C and 10^o C to 25^o C during summer. There is occasional snowfall during winter in this region. The temperate fruits such as apple, walnut, European pear, pecanut, aprico etc. could commercially be grown in this zone. The annual rainfall is 900 mm in the eastern part and 140 mm in the western part. Most cultivated vegetables and vegetable seeds of cole crops, carrots beet and virus free seed potato is potential in the zone.

Alpine zone: The higher Mahabharat range of northern side and some parts of lower Himalaya has alpine climate. The altitude varies from 3000 m to 5000 m. During winter this zone is covered with snow while during summer this turn into green grass land and up to 4000m seasonal cultivation of cold tolerant crops and winter hardy fruits can be planted. The mean temperature during winter varies from 0^o C to 5^o C, during summer it varies from 0^o C to 15^o C. This zone can be exploited for special vegetable and vegetable seed production of bienial crops, spices and flower.

Special situation: In addition to the above four distinct climatic zones, there exists some special pockets within the mid-hills, high-hills and trans Himalan zones with different agro-climatic condition. These pockets are the low lying deep valleys, deeply cut river basins, trans Himalayan monsoon free plateau and some areas of hill tops and leeward side of tall mountains. In these pockets the special micro-climates prevail and such micro-climates differ from what is usually found in the common zones. These special pockets are suitable for special crops during special seasons.

SOIL RESOURCES

In an agrarian country like Nepal, soil plays a vital role in agricultural production. Nature has gifted Nepal with different kinds of soils. The Terai plains and river basins soils are made from alluvial deposits suitable for many types of crops including fruits and vegetables.

In the hills the soils are formed by rock degradation, podzolic deposits and from organic decay. Thus the soils are of medium to light textured with the dominance of sand and gravel. Because of the sloppy topography and steepness the hill soil are more prone to erosion and landslide. The hill and mountain soils are not fit for cereal cultivation which needs frequent digging and turning. However, these soils are suitable for permanent plantation crops, fruit crops, cover crops and perennial herbs.

WATER RESOURCES

Water is another important resource and plays major role in the Nepalese agriculture. Though the country is rich in water resource with a large number of big rivers and thousand of small rivers, very limited portion of water resource has been used. About 15 percent of the total cultivated land has assured seasonal irrigation facilities of which 80 percent is concentrated in terai plain a few tars and river basins. Most hills are not feasible and possible for irrigation investment. The main source of water for crop production in Nepal is monsoon rain and winter rain. The annual rainfall varies from less than 250 mm (Mustang area of the western Himalaya) to more than 4000 mm at Lumle near Pokhara. The rainfall decreases from central Nepal towards west. Beyond the great Himalayan ranges in the central and western Nepal there exist rain shadow area.

About 80 percent of the precipitation is received during monsoon from mid-June of mid- September and 20 percent during winter (October through March). There is occasional shower during April. Usually, April to June is dry in Nepal. Due to the impossibility of river water utilization in the hilly terrain and also due to the uncertain precipitation, soil moisture is the limiting and detrimental factor for year-round annual crop production in the hills of Nepal where major portion of population reside . In such situation, deep-rooted fruit crops and low moisture requiring spices and vegetable crops have comparative advantage in the hills of Nepal.

BIO GENETIC RESOURCES

As Nepal has a wide range of climatic variations, that makes the country very rich in plant genetic resources. The total number of edible agro- horticultural crops available in Nepal is roughly estimated to be more than 400 as species and sub species (Regmi 1990). However from these enormous plant species, very few have been utilized and others are not ever cared for domestication (Devkota 1990). In between highly utilized and wild species some horticultural crops are little known and their uses have been limited to the people of the area where these plants are traditionally grown or are growing voluntarily. These bio-gentic resource and bio-diversity are another living resources for horticultural development in Nepal. Many plant species have been originated from Nepal and are still being remained in the locality which can be utilized as genetic wealth for crop improvement. Cucumber, egg plant, radish, cowpeas, broad leaf mustard are some examples.

SEASONAL RESOURCE:

Nepal is situated in the temperate zone of northern hemisphere. The annual motion of the earth brings four distinct seasonal change such as dry-spring (mid March to mid June), wet summer (mid - June to mid - September), clear and fair autumn (mid - September to mid - December) and cold winter (mid - December to mid - March). These four seasons are not equally and evenly distributed to all over Nepal. The influence of seasonal change differs as per the difference in physiographic setting and altitude. For example, terai and inner terai including low basins experiences warm temperate climate during winter, tropical climate during wet summer, sub tropical during spring and autumn. Similarly high hills and sub Himalayan region experience tundra climate during winter, cold temperate during late autumn and early spring and warm temperate during summer. From the seasonal benefit, mid hills is the most favorable area. During summer this area experiences sub-tropical climate, warm temperate during spring and autumn and cool temperate during winter. Almost all types of crops can be grown in this region provided this seasonal resource is utilized appropriately. During summer cole crops, radish, carrot etc can be grown in high hills whereas tomato, egg plant squash, cucumber can be grown in terai during winter and spring.

HUMAN RESOURCE

Human resource is the active resource to mobilize the passive natural resources. Human resource plays paramount role in the development of any country. In fact the development itself is needed for human being and is brought about by human being themselves. The human resource available in Nepal for horticultural development can be classified under the following five categories.

1. Horticulturally educated professionals -: This category includes the practicing horticulturists of MOA (DOA, NARC), TU(IAAS), horticulturists working in INGOs, NGOs, private sector and supporting horticulturists such as, horticultural entomologists, pathologists, soil scientists etc.. The number of these horticulturists is estimated to be about 300 (500 if J.T./JTAS included 500)
2. Horticulturally informed non-professionals -: This category includes large number of agricultural graduates and technicians who received limited theoretical information during their education but devoid of practical knowledge and field experience directly. They are agro-administrators, agro-traders and the topicals of different agricultural institutions and offices. Some of them are holding the position for horticulture development and impose masking effect on horticultural professionals.
3. Horticulturally conscious non professionals -: This category includes the most agricultural field workers engaged in the general agricultural extension, inputs, distributions and credit management. They are jack of all trade - type human resource who can create awareness about horticultural development. They can not transfer techniques and skill as they themselves do not have sufficient skill and knowledge of the subject. Some progressive and commercial horticulture farmers also come under this category.
4. Horticulturally sub-conscious -: This category includes, the most traditional farmers, who are growing a few fruits, vegetables, spices and flowers in their backyard and wasteland as their traditional crops. They also grow some improved varieties irregularly as and when the planting material is made available through some extension agent. A few of them even buy the planting materials it available easily.

5. Horticulturally unconscious :- Under this category very few farmers who are not cultivating any horticultural crops, landless town dwellers, full time non agricultural labourers and other professionals may be included.

FINANCIAL RESOURCES

Financial resource is the means to mobilize the natural and human resources but not the end in itself. While talking the financial resource or budgetary expenditure for horticulture development in Nepal, the different financial sources should be considered. These source include the HMG budget allocation and expenditure, the expenditure made by the different donors, INGO's, NGOs, entrepreneurs and by the farmers themselves for horticulture development. HMG financial resource is very important to attract parastated and private sector money in the right direction.

REVIEW

Cereal based, subsistence agriculture has been the main stay of the country since time immemorial. Because of the topographic and other constraints like inaccessibility, remoteness, scattered small and marginal land holdings, lack of marketing and communication facilities, ethnicity and individual feelings of farmers, lack of alternative means of livelihood and other social and geographical features, the developmental options are limited in the country. Therefore the horticulture development has remained stand still and traditional means of livelihood for centuries over centuries are prevailing.

Though theoretically variations in altitude steepness, sloping, facing, temperature, rainfall, soil and water resources offers comparative advantages for the cultivation of various horticultural crops including, tropical, sub-tropical and temperate fruits, vegetable, flowers, spices and medicinal herbs, these offerings could not be harvested because of the imbalance mobilization of natural, human and financial resources in the past. The brief historical review of the resource mobilization for horticulture development may be recalled as follows.

Initial era (1940-55) :- During this period, the need of organized horticulture development was felt by the then governments. Different horticultural experimental farms and nurseries were established by the government. Horticulture experimental farms at Chhauni, Balaju, plant introduction units at Godawari and Singha Darbar, agriculture farm at Kakani and Parwanipur are some examples. In these farms the basic horticulture development activities were initiated. In this era the knowledge of natural resources was limited, very few trained manpower was available, the external funding was almost zero, the development of transport and communication system was at rudimentary stage. Therefore the mobilization of resources were also minimal. However the workers of this era created the foundation for further development and opened the eyes of the government and beaurocrates.

Establishment era (1955-70) :- Horticulture development took a new dimension with the beginning of Tribhuwan gram bikas with block development program.

With the beginning of the planned development, the horticulture sector was given some more attention. The eco-zonal based approach was conceptualized since the sound five year plan. In the year 1959/60, the horticultural units in the agriculture centers of Terai (Tarahara, Nepalgunj etc.) and the separate horticulture farms in Kritipur and

Dhankuta were established. In 1967 a separate department of horticulture was established to meet the developmental demand of horticulture. Under the department of horticulture nearly two dozen horticulture farms and stations were established in different ecological zones, however some of them were inappropriately located.

To develop human resource, a large number of students were sent for academic and non-academic trainings.

A substantial amount of foreign grant was also available for the establishment and the development of horticultural activities during the period.

Though a large number of people were sent for studies but they were not specifically utilized in the horticulture sector. The Department of Agriculture Research concentrated mainly on cereal or agronomical crops and the researches on the horticulture sector remained weak.

Experimental era (1970-90) :- The natural resource mobilization during this period remained slow but steady, some very important experiments were conducted in different ecological regions. This eco-regional based development approach, initiated in establishment era was further strengthened and developed with the formulation of ten year agriculture development plan since 1973 which emphasized commercial horticulture along the high way vicinities and high value low volume horticultural cash crops in the remote area and special production pockets. The high hills of central and western Nepal was emphasized for production of high quality vegetable seeds, temperate fruits dry fruits and medicinal herbs with the assumption that the road and other related infrastructure would be developed with the same speed as that of horticulture, however, it could not happen.

During the establishment era, most of the higher level (gazetted) human resource available were from urban families and were limited in number. From 1970 onward the availability of human resource increased and the most of them were from rural farming families and had better vision for horticulture development. Beaucratic norms and systems, though not perfect, but was relatively disciplined and established. Sectorial command, eco-zonal approach, well motivated team of specialists however with the limited amount of fund could bring some tangible out put in the field of commercialization of citrus in the mid hills, fresh vegetable and vegetable seed production in appropriate areas, spices and plantation crop development in western and eastern development regions. The horticultural products and the technologies presently available are the outputs of the experimental era.

Anomalous era (1990-to date) :- Unfortunately with deep sorrow and grief, we are compelled to accept the recent years as an anomalous era for horticulture development. We were very much hopeful that after the restoration of democracy the horticulture development will speed up and the country will prosper through the balanced mobilization of natural, human and the financial resources. It was hoped that the horticulture development will proceed ahead with clear-cut policies and strategies with clear priorities of commodities emphasizing goal oriented activities. In the beginning of the eighth plan, the policy of comparative advantage and convergent planning was announced by the government. But on the contrary, the implementation of above policy could not be materialized because of the distortion and mismanagement of human resources, frequent changes in the organizational set up and the poor allocation of financial resource.

Moreover the mushrooming of NGO's and INGO's has diverted and dispersed the financial resources of donor community with the hope that NGOs are i) close to their beneficiaries, ii) innovative iii) less beaucratie and iv) cheaper than the government.

However, with the passage of time it is becoming apparent that the most NGOs do not necessarily have these characteristics. Many more horticultural activities of NGOs are duplicated or even triplicated in the same area where government has been doing the same activities since long back. This is happening because of the crisis of coordination and the appropriate affiliation of NGOs with concerned link ministries and agencies. This is one way how the financial resource is mis-mobilized. On the other hand the allocated foreign loans and grants are under utilized by the government due to insufficient amount of counterpart fund and frequent change of project management (human resource). The third anomaly in the horticulture development in the recent years has been the mandatory and the functional contention among different institution (DOA, NARC, IAAS etc.) related to horticulture development. Unclearity of institutional goals and individual responsibilities in these institutions vis a vis functional coordination and linkages in technology generation, verification and transfer has remained anomalous due to self centered policy adoptions by the policy maker and the authorities.

PRESENT STATUS

The abundant horti-potential natural resource has remained under utilized. Though some rational policies and programs have been introduced but they are weakly implemented owing to non-conducive administrative, financial and political environment. Lack of transportation preservation and marketing facilities is playing antagonistic role in the horticulture development process in the remote areas, even though the agro-climate is best suited for certain horticultural products (e.g. temperate fruits of Mustang, Dolpa and Jumla). The strategies adopted for commercial horticulture development along the high - way corridors and the vicinities of urban centers have not been fully implemented except few cases of off-season vegetable production. The simulation has not been built in the program with appropriate institutionalization of human resource and the financial resource allocation.

The non existence of pricing policy for major horticultural products accompanied by irregular supply of such products, is discouraging export and self reliance but encouraging import.

The present HMG system of financial resource allocation among different sub sectors (crops, horticulture, plant protection etc.) does not have well defined goal and output oriented but are numerically splited activity oriented, which leads to no where. However, 100 percent achievement is always reported. The general scenario of financial expenditure on horticulture development (both in research and extension) do not comply with transparency, accountability and the output oriented performance. In a nut-shell the present anomaly of horticulture development is caused by the following specific reasons.

- Lack of clear cut strategies and political commitment and beaurocratic willingness.
- Poor technology generation and transfer system due to lack of coordination among NARC, DOA, IAAS and horticulture related para statal and private sector.
- Poor physical and road infrastructure limiting the utilization of agro-climatic and natural resources for high productivity of horticultural crops.
- Insufficient and non-transparent budget allocation for specific priority areas of horticulture.
- Poor and suppressive human resource management.

DISCUSSION

In the recent past many good policies and strategies for horticulture development have been stated in the planning documents. Well prepared twenty-year horticulture development plan has been published. However these policies, strategies and plans are well planned and piled in the shining book shelves of the authorities and are used as good reference for writing new papers and plans that never reached down to the farmers field. Agriculture prospective plan (APP), the most recent well appraised document has prioritised four horticultural commodities as high value crops to triple the income of the farmers. These commodities include.

- ◆ Citrus throughout the mid hills
- ◆ Apple in the inner Himalayan zone
- ◆ Vegetable and flower seed in the hills and mountains
- ◆ Off season vegetables in the hills as well as in terai

According to APP strategy the high value crop sector is a private sector strategy and the growth rate, for high value horticultural cash crops, is considered as demand driven. Of course it is private sector demand driven enterprises, however they are also technology specific and risky enterprise. Therefore the resource mobilization policies for the sector should have to deal with risk minimizing measures and specific technological package development and transfer to private sector, through strong research, reliable infrastructure and service support and functional credit programs. Otherwise the APP strategy will also remain as white elephant or forbidden show case apple.

FUTURE APPROACH

The Mahabharat Episode always ends with the heart touching melody.

“Shikhen hum bite yugonse”

Nayen yugaka karen swagat

i.e. let us learn from the past, and

accept/welcome the new age or new challenges.”

Horticulture development is a long term, long chained process which requires balanced, dedicated and continued mobilization of natural, human and financial resources both from public and private sector.

Considering the small and marginal land holdings of the majority of hill and mountain people with their low investment and low risk bearing capacity governed by subsistence cereal crop oriented agricultural practice, therefore, the mobilization of their natural resources for demand driven horticultural production under their display, should be inter linked with the alternative cash earning activities such as bridges and rural road construction. That is to say rural road construction and fruit tree plantation in the remote area should be implemented simultaneously. This will facilitate the marginal farmers to buy cereal grains with the cash earned working in the road construction to compensate the cereal crops foregone by fruit tree plantation. After 3-5 years when the road construction is over the fruit trees will start bearing and the farmers, by selling fruits, not only can maintain their families from this income but also will raise their standard of living. Thus citrus and apple cultivation can be popularized in the hills and inner Himalayas. However this approach should strongly be backed by refined horticultural technology with high quality disease free planting materials, marketing, processing, storage and post harvest handling facilities. Community based resource nurseries and

technical service support centers, should be established in the priority areas complying with the natural resources.

The existing well-trained high-qualified human resource presently available for horticultural development though not utilized appropriately, will be retiring sooner or later. The higher level human resource development at present is in retardation, compared to seventies and eighties. This is the greatest mis-fortune for future prescriptive. The government should immediately open M.SC. classes in IAAS in different discipline prioritising horticulture to meet the tempo of APP. Similarly subject matter specific training also should immediately be started in horticulture centers located at Kritipur Sarlahi, Dhankuta, Khumaltar and Mustang.

Similarly the existing faculties should be resynthesized as per present need of commodity based approach such as horticulture, agronomy, livestock and fisheries. The source-oriented faculties should be restructured under the main faculties such as horticulture soil, horticulture, pathology, horticulture entomology and so forth. Equal opportunities should be made available to all the professionals working under the main faculty and sub-faculties. This will facilitate better human resource mobilization and remove facultative conflict.

The most important issue should not be one which gets to administer the financial resource but one which benefits from the resource. Therefore to monitor the appropriate financial allocation and mobilization, there is immediate need of structural modification in MOA, DOA, NARC, RD and ADO. Appropriate pigeon holes of different levels for horticulturists in these organization and the placement of right person in the right position would facilitate both financial and human resource mobilization. In this subject a separate working group should be formed represented by at least five horticulturists, each one from private sector, retired group, DOA, IAAS, and NARC.

The financial resource allocation should be judicial. If the human resource is managed well, it will automatically be improved and increased.

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