

# PROJECT WORK

ON

# ENVIRONMENTAL STUDIES

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Q Agricultural practices (Terrace cultivation) and its impact on the environment in Zapami Village.

— Zapami Village is a small village in Putseno Tehsil in Phek District of Nagaland State, India.

Agriculture is the main economic activity of the people of Zapami village and paddy is the main crop. The people of Zapami Village practiced both Jhum and Terrace cultivation. Farming is their livelihood and the richness is measured in terms of how much grains a household owns. One prominent feature of traditional agricultural practices is its high degree of agno-biodiversity. The high agno-biodiversity evolved through exploitation of local site factors, consideration of food security for the family, judicious selection of crops and varieties for cultivation, diversified forms of traditional agricultural systems and in recent years, the case income

generating possibilities. The main crops are rice, maize and pulses. Cash crops like sugarcane and potatoes are popular. principal crops are Arums, yams, maize, potatoes, etc. Vegetable crops are cucumbers, spinach leaf, mustard, chillies, carrots, tomatoes, etc.

Terrace are horizontal human-made spaces created for the cultivation of crops on the slopes of hills and mountains. They are constructed to provide a wide range of surface areas for cultivation on hill slopes and to support farming for the long term. Terracing helps in the reduction of water flow, soil erosion and increases water holding capacity. It can create various micro-climates that protect crops from high winds and can increase the intensity of solar radiation on a field.

Terrace farming is a common agricultural practice followed among the people of Zapami Village. The terrace cultivation on

wet cultivation, which is predominantly practiced by the Zapami people, depends on the climatic conditions. Terrace is a permanent field of cultivation because once it is made it continues for indefinite period. For terrace cultivation a gentle slope land is selected and is made into several flat plots for cultivation. Once the plots are made and arrangement of irrigation is done, no large capital expenditure need to be made every year. For irrigation water from monsoon stream or a fall is canalised to the field and the land is cultivated every year in the same manner. Unlike the plain areas, perennial irrigation and irrigation from tube-well or tank is not possible. In this system the top soil is not washed away and the fertility of the land is retained through occasional application of cow dung or other natural manures. After the lands get adequate water from the canal, the earth is tilled with spades and made into thick dough. As soon as the land

is ready, the paddy plants are transplanted there, straight from the seed-bed. After transplanted the plants ~~started~~ started growing within a week's time. It requires minimum weeding and is harvested during October - November. Water is allowed to remain accumulated in the field till the crop matures. As the fields are small and the topography rugged modern agricultural implements such as tractors are rarely used for ploughing and harvesting.

Terrace cultivation or terrace farming, is one of the oldest types of land and water resource management for large-scale farming. The terrace cultivation among the Zapami people is one of the most sustainable forms of agricultural practices in the hilly terrain. There are no tube-wells, lift irrigation technology or jet pumps, no tractors or oxen, the farmer uses only a spade to work in the field, simple, yet meticulous

methods of land distribution and wise water management plan chalked out by farmers make farming still possible. Split bamboo channels run through the field and the water sources from the higher slopes provide adequate supply of water for the crops.

Paddy is grown as a primary crop in the terrace fields, and it is the staple diet for people in Zapami village. However, it is not just monoculture where a single variety of paddy is grown. The field also have corn and diverse types of vegetables. Some crops, which are part of the first batch of the winter harvest are potato, spring onion, pumpkin, tomato and mustard leaves. There is an ecological balance maintained by the water algae, which spread across the field after farmers harvest paddy. The algae maintain soil fertility for the sowing season. In these watery fields; fish,

snails, frogs and crabs were found which add protein to the diet.

Farmers also grows pigeon pea, some other varieties of pulses and small trees with soil binding capacity by terrace field bunds, to check landslides. The water for these fields is equally distributed. There are strict rules followed by the farmers to keep the height of the water inlet at the same ~~level~~ level for every terrace field so that there is no imbalance in the distribution of water.

Some benefits of terrace farming are:

1. Terrace farming boosts water conservation and runoff reduction;

Terrace act as many micro-watersheds across the whole slope. Therefore, it directly reshapes the micro-topography of hill slopes. These factors enhance the efficiency of rainwater harvesting by changing hydrological pathways. Thus, it increases water holding capacity and soil moisture

## 2. Soil conservation and control of soil erosion:

Terracing weakens rainfall-runoff effects by reducing the water velocity and total amount of debris flow. This leads to an increase in biomass and surface cover. Terraces have ~~embanked~~ embankments on ridges which increases the efficiency of soil conservation.

## 3. Improve land productivity and soil fertility:

Due to the reduction in soil eroding and having high water holding capacity, terrace farming improves soil fertility and land productivity. Example: In rice terraces, irrigation is designed not only for supplying water to paddy crops but has various other ~~for~~ purposes as well. In addition to the protection of terraced paddy fields, the unique practice of year-round irrigation plays many essential roles, including storing water, maintaining favourable soil conditions for rice growth and providing a habitat for various edible aquatic animals.

## 4. Ensure food security and crop yield:

Water scarcity and soil erosion are the problems for the mountains. Terrace farming ensures



food security and increases crop yield by water and soil conservation. Thus it reduces soil erosion. In terrace farming, the interaction between water and fertilizer increase results in high yield.

5. Enhances biodiversity and helps in ecosystem restoration and enhances biodiversity:

The practice of Terrace farming in mountains or another region where standard cultivation not possible plays an additional measure that benefits ecosystem restoration and enhancing biodiversity.

6. Enriches recreational options by creating aesthetic landscapes:

Many terraces practices in the world classified as "cultural landscapes" heritages. Cultural landscapes, defined as "distinctive geographical areas or unique properties that represent the combined work of nature and man" by the World Heritage Committee. Terrace have been identified as part of a "cultural landscapes" heritages and play a key role in

aesthetic appreciation and spiritual enrichment

The impact of terrace cultivation on environment are:

1. Disruption of water circulation:

Terracing plays a clear role in the conservation of water and soil sources, and quantitative research prove the effects of terracing on the interception of runoff. However, effects of terracing on hydrological processes should be noted, especially in areas with water resources strain. Large area of terracing increases water volume in the terraced field itself consequently reduces the outflow volume by intercepting runoff, altering the path of runoff and decreasing the hydrological connectivity so as to encourage it to infiltrate modelled different scenarios for surface runoff and the result displayed that runoff could not connect the channel of a catchment if terraces were present.

2. Erosion due to poorly designed terraces:

Although terraces are considered advisable and effective measure for soil and water conservation.

Nevertheless, negative effects of poorly designed terraces are always concerned. Improper terraces induce rill and gully erosion. On the one hand, terracing and contour ridges were always constructed on the steeper hill slopes, thus, the terraced field surfaces are not completely level. Gully erosion on terraced fields was discovered to occur mainly as the terrace on contour ridges have a relative inclination. These inclined terraces accelerate runoff concentration which give rise to increase rill or gully erosion during heavy rainfall.

Terrace-induced ecological problems. Overland runoff flows along the inclined terraces and concentrates in the lower part of terraces, consequently causing severe gully erosion. The mobilised material is accumulated in the lower section of the risers with low vegetation cover.

### 3. Deterioration of soil quality:

The degradation of soil quality on newly built terraced fields can be explained by the fertile topsoil is removed, soil structure is

destroyed and nutrient loss due to soil and water loss. Firstly, soil structure is primarily affected by disturbance from the reshaping of slope topography. The creation of terraces can lead to the removal of fertile topsoil and the upturning of subsoil. Similar to soil loss and erosion, when topsoil is removed by terrace construction, it is likely to be deprived away. Such extensive soil redistribution and land leveling processes may also cause significant soil carbon perturbations. Furthermore, changes in nitrogen and carbon content of soil are similar, the nitrogen contents decrease with soil loss and vegetation reduction.

Terracing not only brings benefits and hope to people but also ecological risk. With the development of economy and society, terraces are no longer just for cultivating traditional crops, more large-scale terraces are used to develop economic forests and fruits tree for a higher economic benefit.

Terracing requires huge inputs of

labor to construct and maintain, and when not properly maintained, the effects can be catastrophic. Unmaintained terraces can lead to mudslides, the creation of deep gulleys and increased soil erosion, particularly in sandy soils or on extremely steep terrains. Terracing also has been shown to reduce soil quality via the leaching of important nutrients from the soil in some areas.

References 1