

BEFORE THE NATIONAL GREEN TRIBUNAL  
PRINCIPAL BENCH AT NEW DELHI

O.A. No. 316 of 2022

**In the matter of:**

**Dr. Sharad Gupta**

**Applicant**

**versus**

**State of UP & Ors.**

**Respondent**

**SUGGESTIONS ON BEHALF OF THE APPLICANT AS PER THE ORDER DATED  
18.05.2023 PASSED BY THIS HON'BLE TRIBUNAL**

Most Respectfully Showeth:

1. In the aforesaid matter, the applicant sent the grievance to this Hon'ble Tribunal vide letter dated 10.03.2022 that as per the News Article published in Times of India dated 06.03.2022. The grievance stated the ravines are being destroyed by large-scale mining in the vicinity of the Taj Mahal and the mining has restricted the floodplain zone of river Yamuna. Destruction of the forest ravines, which are natural habitats for over 1000 species of animals and plants, will lead to the devastation of the ecological chain as well as harm the Taj Mahal. It would also affect the original landscape and contour in the vicinity of the Taj Mahal and restrict the floodplain zone of river Yamuna in Agra, Uttar Pradesh.
2. This Hon'ble Tribunal, vide its order dated 09.05.2022 in this matter, constituted a Joint Committee comprising of the Ministry of Jal Shakti, Government of India, Regional Office of MoEF & CC, Lucknow, TTZ Authority, State PCB and District Magistrate, Agra with direction to submit Factual and Action Taken Report within three months.
3. In compliance with the order dated 09.05.2022, the Factual and Action Taken Report was filed by Joint Committee vide email dated 19.09.2022 and notices were issued to Respondents No 1 to 8.
4. This Hon'ble Tribunal heard the matter on 10.01.2023 and reserved its judgment for on or before 15.02.2023. After going through the material on record, this Hon'ble Tribunal vide order 10.04.2023 was of the considered view that some material aspects of the case

have not been adverted/referred to in the pleadings and at the time of arguments and that the matter required further hearing for due elucidation/consideration of the same. Therefore, it was appropriate that the matter is re-listed for further hearing. Accordingly, the Registry was directed to re-list the matter for further hearing on 18.05.2023.

5. It is further stated that Hon'ble Tribunal vide order dated 18.05.2023 asked for a response on behalf of the District Magistrate, Agra and suggestions by the applicant within two months. The matter was listed for further consideration on 16.08.2023.
6. In compliance with the Hon'ble Tribunal Order dated 18.05.2023, the following are the causes of soil erosion of Yamuna Ravines in the Agra region:

**A) Issue of extent degradation of Yamuna ravines**

i. **Historic background of ravines:** The word "ravine" means deep gorge. The word "ravine" is usually associated not with an isolated gully but denotes gullied land containing systems of gullies running more or less parallel to each other in deep alluvium and entering into a nearby river flowing much lower than the surrounding tablelands. The nature of the alluvial soil in which a major river cuts a channel very deep from its bank, leads to the problem of the runoff from the tablelands, having to negotiate a large vertical fall in a short horizontal distance.

Such a situation creates water flow conditions-conductive to the rapid development of gullies running the area along the river banks, leading to the formation of ravines. Once a gully is formed, it extends by the phenomenon of saturation and slip of its head and sides. Depending upon the soils, geology, vegetation, topography and the runoff from the watershed, different shapes and sizes of ravines are developed.

The National Commission on Agriculture (1976) estimated 3.67 million hectares of ravine land in India, out of these 2.76 million hectares (75%) are spread over the states of Uttar Pradesh, Madhya Pradesh, Rajasthan and Gujarat.

Land degradation is an issue of worldwide concern, as globally around 24 billion tons of fertile soil and 27.000 bio-species are lost each year. Gross soil erosion in our country is 5.11 billion tons per year which occurs at an annual rate of 15.59 ton/hectare (Sharda and Ojasvi, 2016). It not only threatens the productivity of land but also water quality, human health and other ecosystem services on which all life forms depend.

ii. **Extent of ravine land in Agra:** Very extensive degradation of land has occurred along some of the major river systems of the country in various 60 years of research in states in the form of deep gullies. The largest is the Yamuna-Chambal ravine zone. The ravines

flank the Yamuna River for nearly 250 km and attain a depth of more than 80 m in Agra and Etawah. The Chambal ravines flank the river Chambal in a 10 km wide belt which extends southwards from the Yamuna confluence to 480 km to the town of Kota in Rajasthan.

iii. **Problems of Soil Erosion:** Presently in Uttar Pradesh, 68.49 lakh hectares of arable and 19.94 hectares of non-arable land is adversely affected by soil erosion. In addition to that 12.30 lakh hectares of land are ravinous, 11.5 lakh hectares saline, 15 lakh hectares diara, and 8.1 lakh hectares are waterlogged. Groundwater salinity is a severe problem in Agra and Mathura districts. In Uttar Pradesh, 130 soil conservation units had been operating in the plains and 19 units in the hills. These soil conservation units are being managed by 19 divisional soil conservation units. These units are carrying out surveys of problem areas, planning, and execution.

iv. **Rainfall Erosivity Analysis:** The ravines are degraded land due to excessive erosion of soil due to high-intensity rainfall in the area during the monsoon period. The soils of the ravines are sandy loam and devoid of vegetation hence prone to water erosion caused by rainfall. Hence attempts were made to assess the erodibility of rainfall for estimation of soil loss.

v. **Gully Erosion:** Gullies are the extreme form of soil erosion and network of gullies deeper than 0.3 m is known as ravines. Once the process of gully formation is initiated, it rapidly leads to extreme terrain formation. Apart from land and soil quality degradation in gullied and inter-gully areas and declined productivity of food, fodder, fuel etc. these areas become major sediment-producing sites and increase the sedimentation in rivers. Hence, the extension of these gullies should be checked and gullies may be treated with suitable conservation measures for their reclamation and put them under productive use.

7. In compliance with the Hon'ble Tribunal Order dated 18.05.2023, the following are the preventive suggestions to tackle these issues:

i. **Rainwater harvesting and recycling through a silpaulin-lined pond in reclaimed Yamuna ravines:**

The ravine areas have insufficient availability of water due to low, erratic and uneven distribution of rainfall. In reclaimed Yamuna ravine land this type of pond may be useful.

ii. **Prefabricated Drop Spillway for Rehabilitation of Gullied Lands:**

Well-designed and constructed most effective bench terraces are eroded if outlet structures are not simultaneously constructed. The in-situ construction of outlets is limited by the requirement of a large volume of material, skilled mason, water and time besides its high cost.

**iii. Resource Conservation and Economic Utilization of Yamuna Ravine Land through Bamboo (*Dendrocalmus Strictus*) Plantation:**

The study by the Indian Institute of Soil and Water Conservation (IISWC) Research Centre, Agra was initiated in 2009 at Manikpura village, block Pinahat, tehsil Bah, district Agra UP. The bamboo plantation was supported with soil and water conservation measures such as trenches, bunding, etc. The survival percentage of bamboo seedlings was observed to be around 78 per cent.

**iv. Hydrological performance of bamboo plantation**

Bamboo plants under treatment imposed on ravine lands considerably influenced the soil's physical and chemical properties. The soil studies revealed that low soil pH (8.63) and high soil organic carbon content (0.86%) were recorded in comparison to initial values (0.62%) apart from reducing soil loss pattern in Manikpura ravine watershed. Soil losses over the four years have also come down from 4.27 tonne/hectare per year to 0.60 tonne/hectare per year. The results are in conformity with the findings of Rao et. al., (2012) who reported that runoff and sediment behaviour under the bamboo plantation-based interventions absorb more than 80% of rainfall. Due to the influence of vegetation on soil, the permeability of the soil was increased resulting in reduced surface runoff, soil loss, evaporation and better water penetration into the soil as well as increased drainage capacity of the soil.

**v. Evaluation of various fodder grasses for Yamuna ravines:**

With a view to assessing the suitability of various types of grass for fodder production in the ravines, adoption potential of *Cenchrus ciliaris*, *Cenchrus setigerus*, *Dicanthium annulatum* and *Panicum antidotale* was studied by the Indian Institute of Soil and Water Conservation (ISWC) Research Centre Agra under regional conditions. These grasses were grown to evaluate their productivity in the Yamuna ravines at Agra. Among all, these grass species recorded the highest yield.

**vi. Stream Bank Protection by Vegetative Measures:**

Floods in the meandering Yamuna River cut the banks of the river. A vegetative barrier of *Ipomoea carnea* was used to stabilize the stream bank. To reinforce the resisting power

of *Ipomea carnea*, *Tamarix dioica* and *Prosopis juliflora* were also planted which encouraged the deposition of silt. Thus, the process of bank erosion was reversed to land reclamation and channelization of the river into a straight course. In twenty years, not only the stream bank erosion could be prevented but also by siltation all along the bank, about 30 m width of land had been reclaimed. On the reclaimed and stabilized stream bank, 20 m wide strip was planted with *Eucalyptus tereticornis* at 2 m x 2 m in 1979. In 1984, after 5 years, *Eucalyptus* was harvested for pole. *Eucalyptus* could attain an average height of 12 m weighing 30 kg tree. Each plant produced one pole of 5-6 m in length. At the rate of Rs. 20/- for each pole, it could fetch Rs. 50,000/-. The remaining wood also was 25 t ha giving a return of Rs. 10000/- at the rate of Rs. 400 t'. Thus, total return worked out to be Rs. 12000 ha yr (Prajapati and Malhotra, 1985).

**vii. Potential of Horticulture/Hortipasture for Productive Utilization of Ravines:**

Usually, the ravine lands are associated with some river system and if provision for irrigation can be made with some capital investment, these lands can be utilized for economic utilization through the introduction of hardy or underutilized fruits which can withstand the harsh resource-poor conditions of ravines. Studies conducted at ICAR-IISWC, Research Centre, Agra for evaluation of suitability of fruit trees for use in ravines have found that hardy fruits like aonla (*Emblica officinalis*), ber (*Zizyphus mauritiana*), karonda (*Carissa carandus*), kinnow mandarine, pomegranate (*Punica granatum*) and bel (*Aegle marmelos*) can suitably be grown in Yamuna ravines under rainfed conditions with the provision of life-saving irrigation in the initial establishment period.

The marginal and shallow gullied lands can be reclaimed economically and can be utilized for agriculture, the medium and deep ravinous lands, which constitute about 2/3 of total ravine area, are not fit for tillage and cultivation of agricultural crops due to high vulnerability to degradation and are classified as nonarable lands. These lands should be placed under permanent vegetation. The best scientific land use for these lands is to place them under tree and grass-based production systems involving horticulture, hortipasture, silvipasture, energy plantation and plantation for timber or other forest produce. Thus, these lands can augment supplies of fruits, fuel wood, fodder, industrial timber, bamboo and other minor forest produce if utilized judiciously. In this situation, tree-based farming offers excellent opportunities because of several advantages.

viii. **Flood planning for the Yamuna Bank:** The floods in the Yamuna river in 2023 is a gruesome wake-up call for better treatment of the river and the people who live on the river banks. It is imperative that preventive flood planning on the river banks is done that aids in preventing loss of life and property. Floodplain zoning has been recognised as an effective non-structural measure for flood management. Floodplain zoning measures aim at demarcating zones or areas likely to be affected by floods of different magnitude or frequencies and probability levels, and specify the types of permissible developments in these zones, so that whenever flood occur, the damage can be minimized.

8. It is pertinent to mention here that in district Agra under the Ministry of Agriculture, Government of India, the ICAR- Indian Institute of Soil and Water Conservation (IISWC) Research Centre which was initially established as the Soil Conservation Research Demonstration and Training Centre at Agra in 1955. Subsequently, this Centre was upgraded to a full-fledged Research Centre in the year 1957 with the objective of developing scientific and technological know-how to deal with, understand and negotiate the problems of ravine lands through scientific solutions for sustainable resources conservation and production. In 2014, the Central Soil Water Conservation Research and Training Institute was renamed as Indian Institute of Soil and Water Conservation (IISWC) Research Centre, Agra.

As this Centre has developed scientific and technical know-how to deal with the problems of ravine lands on the bank of the Yamuna River. The centre has been contributing to research for tackling the problems related to soil and water conservation, agriculture and tree-based production systems in the ravine region of the Yamuna river system for the past six decades.

And its deals extensively with the extent of land degradation in Yamuna ravine region. It deals with major problems faced by ravine-infested areas and suggests remedial measures for tackling them. The reclamation/rehabilitation of ravines may in turn lead to improved social equality and reduced poverty in the ravine region.

As such when government own a scientific body which has been established specially to deal with ravines and its reclamation through research work in this field.

As they are having vast experience in this specific field. So, their expertise, services and recommendations should be utilized by government authorities and Department of Forest.

THROUGH



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