Problem and need of the area, classification of Gullies and Ravines of Dholpur district its analytical study.

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PROBLEM AND NEEDS OF THE AREA

A great degree of variation in the slope gradient, depth of soil, characteristic rainfall distribution, rainfall intensity, traditional cultivation practices, small and scattered holding and lack of financial resources are amongst the many problems of the area. The major problems of the area are discussed as under. Erosion: Due to concentrated and high intercity of rainfall over a period of on three months, variation in slope gradient and scarce vegetative cover the problem of soil erosion by water is sever to very cute in district mainly along the bank of Chambal and Parbati rivers. Due to erosion gullies and ravines are formed. The gullies and ravines are serious problem in district. These ravines have ruined many hundred hectares of land. These ravines have become a shelter place for dacoits. In addition to loss of soil mass and fertility too. Therefore the need to control the fully in from earlier stage Usually the gully starts with a vertical or nearly vertical head cut. Once established the head cut advance and channel widen by sloughing and under cutting of banks. The depth and size of gullies depend on many factors, the primary factors are quantity and duration of flow, the characteristics of soil and bed material and the gully bed slopes. Runoff quantity and duration of flow is major factor which provides energy ofr cutting and transportation of eroded material. The gully bed slop is also one of the main sources of providing energy to the flowing water to cause gully erosion. Due to many factor involved the fully head advancement not only vary from area to area but also from year.

CLASSIFICATION OF GULLIES AND RAVINES

The gullies or ravines are described and classified according to stage in which they are according to depth. The following classifications are general standards for universal application.

CLASSIFICATION ACCORDING TO STAGE

a. Initial stage of gully formation
b. Active stage
c. Healing stage
d. Established stage

CLASSIFICATION ACCORDING TO DEPTH AND WATERSHED AREA

The ravine reclamation planning depends on the depth and watershed area of the gullies. If the depth and watershed both increases, intensity of problem also increase.

CLASSIFICATION ACCORDING TO DEPTH:

Description	Depth (in Meters)	Symbols
Shallow gullies or ravines	1 or less	D1
Medium gullies or ravines	1 to 5	D2
Deep gullies or ravines	5 to 10	D3
Very deep gullies of ravines	10 to 20	D4
Extremely deep gullies or Ravines	More than 20	D5

CLASSIFICATION ACCORDING TO WATERSHED Area:

Description	Watershed size(in ha.)	Symbols
Gullies or ravines with small watershed	Less than 2	G1
Ravines with medium watershed	2 to 10	G2
Ravines with large watershed	10 to 50	G3

Ravines with very large watershed 50 to 200 G4
Ravines with extremely large watershed More than 200 G4

CLASSIFICATION ACCORDING TO SHAPE

Gullies or ravines may be classified as U or V shaped. Narrow, wide and very wide gullies or ravines or ravines are denoted by symbols W1, W2 and W3 usually. These villages are located near of very near to bank of Chambal and Parbati rivers. They are very adversely affected by gullies or ravines. The information of gullies or ravines are depend up the texture of soil and slope gradient. Along on the bank of Chambal where soil is loamy and gently slope, ravines are not so increasing as fact as along the Parbati river. But sandy soil, steep slope and down pour rainfall are very favorable, Factors to formed gullies or ravines. Wherever, the conditions are favorable, ravines are active D1 and D2 and can be see along the Parbati river while S3, D4 and D5 along the bank of river Chambal. Likewise D1 and D2, ravines G1 and G2 are forming in the catchment area of river Parbati, while G3, G4 and G5 ravines along the area of river Chambal. U and V shaped ravines can be seen on the banks of both rivers.

RAVINES IN DHAULPUR DISTRICT (DUE TO DEPTH)

Near about 15 percent villages are severely affecting by ravines. Agricultural able land is loosing. Due to this many villages have become completed depopulated. The human pressure is increasing on land. Due to increased human pressure on land, vegetative cover is removing by over grazing and fire wood collection. By and large all this resulted in wide spread devastation. The growth rate of ravines is estimated to be 0.4 percent annually and this is high are rate land is being reclaimed. It will require 150 years to complete the work, by which time the total ravine area will be double. This means that the total watershed of the rivers will consist only of ravines and their plain area will be completely wiped out. The problem of ravines is not just of erosion and development of and from time immemorial the Chambal valley has been known for its dacoit gangs, for whom ravines provide safe hide outs. Dhaulpur district is a dacoity area in Rajasthan and ravines are the main shelter places for them. To solve this problem, government of Rajasthan had decided to form a new district of Dhaulpur on April 15, 1982. The ultimate aim to improve the socio-economic conditions of the people and to check dacoity menace in this area. Erosion is an acute problem which occurs over a period of only rainy season. In the area few bunds has been constructed by government by they are not in ravines actually, therefore, these bunds are not effective. Being small and scattered holdings is one of the main hurdle for better management practices and use of improved implements. Due to lack of soil and water conservation measures in the ravines. Most of the rain water is lost as surface runoff. In ravine areas, composite checkdams are provided at the end of small gully as a protective measure against loss of soil and to reclaim the gully beds. A medium gully can also be reclaimed by clearing, leveling and construction of series of composite earthen and brick masonry check dams In order to start the project in a systemic way, the following information is needed:

1. Statistics of population and livestock.
2. Pattern of land ownership.
3. Topography, land use, cropping system and yields of potential capability of land.
4. Data of vegetation, rainfall, runoff, erosion problem and ground water
5. Information of existing water sources like bunds, tanks, walls etc.
6. Service facilities such as, banking, schools, markets, input supply, extension agencies, health and veterinary facilities.

DEVELOPMENT COMPONENT

The following components must receive attention in any watershed development project-

1. Soil conservation measures – moisture relation, safe disposal of runoff, various mechanical measures.
2. Storage and recycling of runoff ponds and storage reservoirs and conveyance.
3. Improvement of fuel fodder production including horticulture and changes in land use, if necessary.
4. Optional land use and cropping system including mid season correct and appropriate cultivation methods.
5. Ground water recharge and development.
6. Water management including drainage, if necessary, lining of water sources, proper field layouts, land use and crop saving irrigation methods.
7. Development of livestock, poultry and other associate activities.

This is crucial component of the watershed development project. Land use questions can be taking in close collaboration with owners and naturally, local people will have to be involved in the development. To promote such an interaction, the size of watershed cannot be too large or too small. It could be between 300-500 ha. and a cluster of several (say 10) such watershed could be managed by a single organizational unit. The organization which is to implement these project, should be capable of integrating extension, inputs and marketing. The ideal solution will be to create a watershed development agency at the unit level. Which has all te powers to plan, organize and implement the entire project. Alternatively, the watershed authority, as in G.R. Halli project, could be the powerful organization to plan a project, allocate funds to the agency, who in turn, will execute the projects without people's participation, the watershed development agency could incorporate selected representatives of the local people. In fact, the constitution of village society in the watershed area is the unique feature of the sukhomajri model. The natural resources (grasses, forests and water) development in the watershed by the village society are shared equally by all the members. This is yet another important feature of development in such areas. The forest department who owns the dam and catchment, is made to agree to auction the grass and tree cutting rights to the village society. In this way, the watershed agency has not only felt satisfied with the implementation of a project but also created a mechanisms which will look after the maintenance and sustained follow up activity in the area. Regular and systematic training of works involved in those agencies must also be taken care of so that the trained personnel are able to discharge their duties effectively. Each watershed of about 300 – 400 ha. could be completed at an overall cost of 8 to 10 lakhs at the present cost in a period of about 3-4 years. Without financial inputs, in the form of subsidies or outright grants, the programs cannot make head way because of the relatively low economic levels of the people for whom this development is envisage. A part from this, watershed development involves community activities like constructing soil and water conservation structures, storage ponds, conveyance systems and afforestation of village common lands.

CONSTRAINTS ON SOIL CONSERVATION PROGRAMS

The question then arises as to why soil conservation is not more widely applied, why so much land is being, wasted in spite of millions of people suffering from hunger, why conservation programs appear to be so difficult to implement. The answer is that conservation needs are much wider than just the application of

soil conservation techniques and require a general policy by which soil conservation becomes an integral part of wide land use and receives support within a social and economic environment which is conductive to the maintenance and improvement of the soil resources.

INVOLVEMENT OF PEOPLE

In planning soil conservation programs, community or cooperative action is indispensable. Small farms which are characteristic in our country. Do not allow for an individual former to have an impact on land improvement, soil conservation programs will therefore, have to be tackled on a watershed basis, as a can created action where all efforts reinforce and complement each other same erosion or flood control measures may be within the reach of a group of farmers but larger undertaking the support of government is also called for. It is clear the government's role to maintain
the country's basis resources of soil and water. Technical assistance programs rs often deny priority to soil conservation programs because of lack of immediate economic returns Ensuring the continuity, of agricultural rather than immediate economic returns should be the deciding factor for investment in soil conservation work, At all times farmers should be involved in the planning and execution of field programs as in the sukhomajri model new management techniques should not become a continuous burden to the farmer; on the contrary, they should not become a continuous burden to the farmer; on the contrary, they should be with the capacity of the farmer and he should understand the beneficial effects. Among the factors which lead to an over pressing of land resources, is the right of ownership to land. Throughout India, there are rights of villages to cut fuel wood, to timber for making agricultural implements. The problem is that these rights make it often difficult to manage efficiently even the so called reserved forest.

INFORMATION GAPS

At present, there is a wide gap between awareness of soil erosion problem and comprehensive action to combat it prospects for establishing comprehensive soil conservation programs are sometimes not good because the proposals may not appeal enough to politicians, decision makers and planners. Also from an economic and short term point of view, they may not be attractive to many farmers. Particularly to those who are in economically weak position. An important reason for the indifference is the lack of information on the problem and as to how to solve it. It appeases therefore, that the interests of future soil conservation programs , particularly in developing countries can best served by creating a better awareness of the problems and solutions and then to obtain effective results within results within a reasonable period.

CO-ORDINATION AMONG DIFFERENT AGENCIES

Experience has shown that legislation alone on soil conservation is really successful in enforcing Government's land-use policies and soil conservation programs , unless it is matched by a greater co-ordination between different agencies executing soil conservation practices and supportive research. Soil conservation works are being implemented by different organization both under control and state sector scheme. Whatever little is done, it is being done in a fragmentary and piecemeal manner and we have spent around Rs. 1,064.05 crore since the beginning of the planning era 37 years ago. However, the bilk of this programs is being implemented in an unco-ordinated manner. This programs also suffers from the very serious drawback of not having a dynamic and effective organization both at the centre and the states, which to provide the necessary leadership and guidelines for effective planning, execution conservation programs are yielding the desired benefits.

NEED OF THE AREA

Afforestation is the main need in such places where ravines are developing. In such soil a definite type of forest should be planted. And the time of planning

it is necessary that the needs of local peoples are also be minded because without their help the work would not be completed. A people have many necessities such as in type of food, furniture, timber and from of energy etc. For completing their needs they can be fail all programs and developing works. So for giving proper development of any programs their local need should be reminded. Afforestation should be type of social forestry, energy forestry, plantation of different species of trees according to needs. In our study area suitable planting area grass, Ber, Avonla and some other trees which give ripen fruits to local people and completed their wood and other needs. In this area Babool, Kikar, Peepal, Bamboo, Neem etc.

For afforesting the ravenous areas, bamboo ahs proved most promising. A good stand of Dendrocalamous strict us raised of Dhaulpur district is seen in the

By this type of afforestation local people gets good fruits to eat and make healthy and a healthy body lives in a healthy so a healthy mind thinks good thought for his progress and give attention for development his area. In other way it here fruits production increasing people gets more money and thus their economic condition will become solid.

SOIL SURVEY AND LAND CAPABILITY CLASSIFICATION

Soil surveys undertaken to determine the nature, distribution and extent of different soils in watershed. Through such a survey, it is possible to determine the evaluate all the combinations of soil characteristic for proper use of land and to interpret them in terms of their response to the management practices.

Type of soil surveys:

The following types of soil surveys are normally conducted:

i. Reconnaissance survey.
ii. Detailed survey.
iii. Detailed reconnaissance survey.

I. Reconnaissance survey

Here, the mapping is less elaborate and small scale base maps are used. The field traverse are made at wider intervals and the survey covers large areas, in relatively, a shorter time. Such surveys provide general understanding of the soils in the area and are useful for preliminary planning. These surveys are made in the areas of lesser agricultural importance as in hilly areas.

II. Detailed survey

The detailed survey are conducted to provide maximum information required for intensive land use according to soil characteristics. Elaborate mapping is done depicting the lowest category of mapping units. Large scale base maps are sued for showing detailed information and field traverse and observation on soil characteristics are made at short interval in the field. The detailed surveys are made in areas of greater agriculture importance for intensive planning. This information is other utilized for soil classification and mapping so that it may utilized by many users.

III. Detailed reconnaissance survey

There surveys are combinations of both reconnaissance and detailed surveys. The region of law potentialities for agriculture use are surveyed according to reconnaissance survey while areas of better agriculture potentialities are surveyed in detail. A brief description of the requirements in different kinds of soil surveys is given in table.

Soil Survey Equipment:

1. Augers – Screw, post hole, tube and power drilled.
2. Implements – Pick-axe, spade, scrow-bar, knife, basket kurpies.
3. Munsel colour charts – Base maps
4. Dilute Hyro chloric acid
5. Magnifying blass
6. Abneyd level, campass
7. Tape, sample bags, labels

8. Water

Table 3.1: Requirements for different types of soil survey Items Type of soil surveys Reconnaissance Detailed Detailed Reconnaissance

Base maps scales average Toposheets I "=1 mile or Cadestral maps Cadastral maps partly for reconnaissance and partly for detailed Variation 1:50,000 , 1:10,000 , 1: 75,000 , 1: 100 ,Mapping Series association complexes Series type phase Partly for reconnaissance and partly for detailed Distance of profile exam. 3-6 km 2-3 profile per ha. Partly for reconnaissance and partly for detailed Distance of auger hole ¼ -1/2 (when heterogeneous) 200 m when heterogeneous Partly for reconnaissance and partly for detailed 1 km when heterogeneous ¼ - ½ (when heterogeneous) Partly for reconnaissance and partly for detailed Plotting of soil boundaries At intervals Entire length Partly for reconnaissance and partly for detailed.

Soil Survey by Travers Method:

Soil survey by traversing is the most traditional method. It consists of examination, classification and mapping of soil in the field. The soils are examined at intervals depending on the type of soil survey and the precision with which the information is needed. Soil boundaries are checked by examination of the soil profile in the fit field at prescribed intervals. Different soil characteristics and land features noted in the field include depth (Table 3.2), texture (table 3.3), erosion hazard (Table3.4) and other additional features like colour, salinity, fertility, moisture capacity, stoniness, undulations etc. The soil are differentiated on the basis of heterogeneity of the soil and the type of survey. The soil boundaries are demarcated and area is delineated into different mapping units. In each unit, a soil profile is studies to characterize the soil in details.

By Aerial Photo Interpretation:

Aerial Photo are the prospective view of the portion of land surface and do not have true scale. These are mainly of two type (i) Oblique (ii) Vertical. There percent till is allowed and nearly 40-60% of overlapping is needed for aerial photo interpretation. The aerial photos are examined and annotated for the preparation of a photo- key for correlating them with the field observations and other soil characteristics. The photos key includes colour tone and texture of the photo. A land scope, being three dimensional duplicate sets of aerial photographs enable us to view of real picture of the soil through stereoscope by adjusting the overlaps, apart from this, soil boundaries are delineated according to the change in the characteristics of the aerial photo impressions. However, field checks are necessary for detailed characterization before the area is classified in to different mapping units.

Table 3.2: Soil Depth Classes

Symbol Name Depth range (cm)

D1 , D2 , D3, D4, D5, Very Shallow Shallow Moderately Deep Deep 0-7.5, 7.5-22.5 , 22.5-45.0 , 45.0-90.0, More then 90.0

Table 3.3: Determination of Texture by Field Method Feel of finger Ball information Stickiness Ribbon formation Texture assessment Texture dass and symbol

1. Very smooth Hard fall when dry cannot be crusted with finger Sricky definitely strains finger 2.5
   cm long ribbon Fine Clay (S) silty clay(SIC) Sandy Clay (SC)
2. Smooth Moderatly hard fall Sricky definitely strains finger 2.5 cm long ribbon when braks earily
   Moderately fine Silty clay Loam (SICL) Clay Loam (CL)
3. Flory Firm Fall Sricky definitely strains finger NO Medium Loam (L)

4. Modertely Gritty Easily breakable fall Stains finger No Moderatly course Sandy loam (SL)
5. Gritty Will shape but no fall formation Slightly strains finger NO Course Loam sand (LS)
6. Very gritty No fall formation Does not strain finger NO Very course Sandy (S)

Table 3.4: Soil Erosion Phase Symbol Erosion Phase Characteristics

E1 No apparent or single (Sheet) 0.25% top soil or original plough layer within a horizon removed. E2 Moderate (Sheet and rill) 25-75% top soil removed E3 Severe (Sheet, rill small gullies) 75-100% top soil and up to 25% sub soil removed E4 Very severe (Shallow guillies) Guilled land E5 Very Very Severe (Big Guillies) Very severely guilled land and sand dunes

Description of common mapping units-

Soil Series A soil series represents a group of soils having soil horizons with similar characteristics and arrange in a soil profile developed from a particular type of parent material but they may differ in the texture of the surface soil. It is generally given the name of the place of geographic area where soil. It is generally given the name of the place of geographic area where soil profiles are first examined and recognized. The series name is very informative and gives a broad picture of the arrangement of horizons of colours.

Land capability –

The grouping of soil into different classes, sub-classes and units is done primarily on the basis of their ability to produce plants without deterioration for a long time. This classification is an interpretative classification based on the effect of the combination of climate and permanent soil characteristics on the risk of soil damage, limitation in use, productive capacity and the management requirement. All the soils within the land capability class are only similar in degree of limitation in soil use.

Effect of Climate –

Climate has a great influence on the capability of the land to produce agriculture, pasture or forest crops. Greater is the amount of rainfall, more conductive it is for production, therefore, with the decrease of the effective rainfall, the capability class also decreases. However, the ill-effects of climate can be mitigated with availability of water for plant growth as in case of irrigation with in turn improves the land capability class.

MECHANICAL MEASURES FOR EROSION CONTROL

Mechanical measures (also called engineering measures) usually involve construction of mechanical barriers across the direction of flow of rain water to retreat retain the runoff and thereby reduce the soil and water losses. The basic components in mechanical protection measures are shown in Photo 3.3. These measures as practiced in India, include contour cultivation, contour bunding , graded bunding , bench terracing, trenching, construction of grade stabilization structures, retention or determination reservation.

Among mechanical measures, field bunding is a common practice for moisture conservation and erosion control in agriculture watersheds. At Dhaulpur, an agricultural watershed treated with contour / field bunding reduced the runoff volume and peak discharge to the extent of 62% and 40% respectively.

The important principles to be kept in view while planning mechanical control measures (Rama Rao, 1960) are:

1. Increasing the time of concentration of runoff and there by allowing more of into be absorbed ad
held by the soil.

2. Intercepting a long slope into several short ones so as to maintain less than a critical velocity for
the runoff water.
3. Protection against damage due to excessive runoff.

Contour Cultivation

Contour operations are done across the slope i.e. by keeping them on contour or nearly so created from a multitude of mini barriers across the flow path of runoff which improve vastly the detention storage in sibi. This will in turn increase the opportunity time and hence the infiltration of rain water into the soil profile where by the quantity and velocity of runoff and hence its erosive potential is greatly reduced. Further, when cultivation is done on the contour in stead of up and down cultivation, much less power is required to be exerted by men, animals and machines. The wear and tear of mechanical parts of implements is less and the job is done in less time. The effectiveness of contour planting and tillage in erosion control varies with slope, crop cover and soil. Maximum effectiveness of contour cultivation is on medium slope and on deep permeable cover from surface sealing. The relative effectiveness decreases as the land slope become very flat or very steep. The ratios of soil less form contour cultivated plots those from up down cultivated plots on different slope groups are
divided. Land smoothing is, required to fill up such depressions of alternatively the depression area are kept under perennial grasses, so that they could serve a as grass water ways. Contour bunding is the most popular soil conservation measures in the country and is practiced on a large scale in difference states. Studies at CSWCRTI, Dehradun and its research stations have shown that contour bunding is suitable for low rainfall areas (Goomm) and for permeable soil to serve both as a water and soil conservation measure. Contour bunding is not recommended for soil with poor interval drainage.

Planning of Contour Bunds

The design of a contour bunding system involves the determination of the spacing between the bunds, the cross sectional elements of a bund and the type and dimensions of the surplus system.

Cross Section of the Contour Bunds

After the spacing between the bunds is decided, the cross section of the bund. The usual shape of contour bunds is a systematic trapezium.

Cross Section of bund Alignment of Cultivation Bunds:

In order to achieve the purpose for which they are meant conserving moisture and soil in the low rainfall areas, strict adherence to contour is to be observed invariably in the field.

Construction of Contour Bunds:

After due to consideration is given to the alignment of bunds at planning stage the bund lines are transferred on to the ground, keeping in view the following factors.

i. The construction should be start from the top of the catchment and proceed downwards
ii. If the upper portion of the catchment is under a different land use and hence the same is not to be bonded, then diversions rains just at the top of the area to be bunded are to be provide to divert the runoff from causing overflow damages.
iii. No intermediate bund is kept unfinished or half finished.
iv. Soil for construction of the bunds is taken from barrow pits of suitable chosen side and numbers.
v. All bunds from top are constructed to their sections.
vi. Barrow pits are located on the upstream side in case of shallow and medium soil and on either of
the sides in case of medium deep and deep soil.

vii. Barrow pits are excavated of equal size after leaving uniform from the bund line. Usually a 3 m
berm is left between the bund line and the burrow pits.
viii. Berms between borrow pits should be kept as less is practicable to bumpy bunds.
ix. At points of deviation, in case of valley (gully) the borrow pits are to be located on the side ride
portions while in case of a ridge on the ridge itself.
x. The berms between borrow pits are retained to avoid concentration of the water towards
depressions.
xi. The cross section of the bund is to checked with templates erected at 150 m distances.
xii. While using a keni for construction excessive removal of top soil is avoided in other words the use of keni is jestricated to construction of bunks in medium deep and deep soil only.
xiii. Ramps are provided for the free passage of cattle agricultural implements and bullock-cart carrying seed and fertilizers in to fields and produce out of the field.

Drainage of Excessive Water:

In order to protect the dry land crops form being overtopped also for avoiding damage to the dryland crops due to water stagnation, outlet structures are constructed to drain away the excess water. These are constructed in a staggered manner so that they will not cause gullying of the filed in between the waste such as clear overfall stone weir, channel weir, cut outlet, Pipe outlet, pump cum waste weirs.

CONCLUSION

To present study entitled 'The watershed management and ravines a case study of Dhaulpur district" was conducted on a typical and full of ravines area in eastern part of Rajasthan in Dhaulpur district in order to achieve optimum output from the resources available or by making minimum investment.

The area was surveyed in order to collect data required for planning and estimates. The total area of the district is 300898 hectares as reported during the year 2006-2007. The area ID divided in to four tehsils including Dhaulpur and the area of the district is rocky. Conditions of the Dhaulpur and Rajakhera tehsil are covered by the Aluminum of Chambal Valley. Masonry stone, kankar bajri, sand stone and lime stone are found in the district and a greate area of the district is covered by Chambal ravines. On the basis of information collected, the following conservation treatment were designed and proposed according to the need Puertorice terrace, contour vegetative hedge, mechanical measures for erosion control, water harvesting and recycling. Agronomic measures in soil and water conservation, grass and management, conservation forestry. Horticulture, agro forestry, loose stone cheek dams, contour trenches and shihi pastral development. Thus the area can be development by following above patterns. In order words it can say such types all managements work will become difficult without help of local people. So there is a need of good harmony between government and local people. In short the watershed is a manageable hydrological unit that makes a harmonious use of the prevailing climate, soil, water, locality, available material and human resources towards stepping up drop yields. In this dissertation it represents case and general studies it is a try towards watershed management and development.

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