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Automation in irrigation to retain the land fertility decreasingboth erosion & surface run off in terraceof hilly or mountainous terrain

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Abstract: *Generally in mountainous hilly area, ground surface is slope in nature but for propare utilization of same for cultivation throughout the year ,it is highly essential to make that land into step like cut or terrace to generate flat surface successively all over the hill. This landscape terracing look like a step having flat surface for cultivate different crop on different seasons. This shape imparts to retain more water , reduce run off & soil erosion also. So in this contest it was decided to irrigate the terrace by automatic manner to full fill the demand of human being to cope with the climate change & to decrease pressure on land resource keeping in mind the present population growth.*
Key wards: *S- Sensor, SV- Solenoid valve*

I. INTRODUCTION:

Terrace Farming is common practice to cultivate crop on mountain surface from ancient time. It is a man made flat surface to cultivate crop & due to flat in nature it can retain the more water as compared to slope mountain surface & also increases time period that land remain fertile as it prevent water loss, run off & erosion, figure -1a,1b&1,c.

Figure-1a

Figure-1b

Figure-1

Different types of Terracing:

1. As per nature of terrace wall position
2. As per the material used to construct
3. As per the climatic condition & rain fall
4. As per purpose to cultivate different crop
5. As per particular hill position & inclination of surface

Benefits of terrace :
Terrace farming has got several benefits in different dimensions
- It decrease the speed of water descending the hill so prevent wash away of crop.
- It increases fertility& productivity of land decreasing soil erosion due to improve of water holding capacity of land.
- More crop can be cultivate throughout the year irrespective of climate change.
- It is possible to convert unused dry land into moist fertile land by using compost.
- It improves to maintain balance in ecosystem by cultivating more crop on dry hillsuface .
- Enriches recreational options by creating aesthetic landscapes

Terrace farming is common practiceIn Indian territory are Punjab, Haryana, Meghalaya, Himachal Pradesh ,Uttar Pradesh, Uttaranchal etc,.In terrace farming ,the following crops are grown i.e., paddy, vegetables, flowers, aromatic plants, cereals,fruits,vegetables, medicinal plants, aromatic plants, oilseeds,maize The major crop include are apple , subtropical plant including nuts & dry

Problems associated with terrace cultivation
- Lands are not even and all the patch of land is not suitable for terrace farming
- Due to lack of water soil is sandy & stony
- It is very difficult to achieve good communication & mobility at hill area.
- Despite sufficient water resources, irrigation facilities are meagre

Land is limited but natural resources grown from it can vary as per need of human beingutility. Sustainable Land Management (SLM)with automated in irrigation is necessary to meet the requirements of a growing population

II. METHODOLGY:

In this paper prime objective is that to develop low cost & reliable design in technique to suit to give adequate irrigation with less supervision &that should be controlled & monitored by central unit known as Microcontroller to solve water scarcity. This paper describes how to avoid unnecessary wastage of water and optimizing the power consumption.

Generally water scarcity is due to both natural and a human being. In conventional type operator has greater role & due to his mistakes knowingly or unknowingly ,there will be heavy loss impaired by human being loosing natural resources e.g., sufficient or insufficient water supply which lead to undesirable situation.

This is micro-controller logic basecentralized control system to carry out suitable irrigation commands as received by moister detected sensor .

Controller:
Micro-processor or microcontroller is act as a central processing unit, that co-ordinates all the operation of the system in systematic manner. The controller is programmed as per the requirement basing on actual ground moisture quality to be maintained for particular crop.So moisture sensors are used to gives feed back to the controller about field moisture level. So Microcontroller act accordingly as per feedback signal received by moisture sensor

Soil plant water monitoring sensors: Different types of devices used to monitor soil-plant water status and to automate irrigation system are listed below:
- Tensiometer
- Resistance block
- Gypsum block
- Granular matrix sensor
- TDR based soil moisture sensor
- Infrared sensors for leaf air temperature
- High frequency capacitance type soil moisture sensor

Solenoid valve: Controllers are connected electrically operated valves (solenoid valve). A solenoid valve is an electromechanically operated valve. These valves are fitted in place of manual gate valve in an automatic system. One valve controls one section. As soon as the signal is received from the controller the solenoid gets activated and valve is turned on which allows passing of water through it. After the signal is stopped the valve shuts off. These are normally two way open and close valves

Moisture sensor: In this arrangement separate moisture detector sensors are arranged on the soil of different terrace & that are connected both solenoid valve & pump ,Figure-2 ,separately for all individual terrace for feeding water to that particular terrace. In this system sensor sense the moisture content of sand & send signal weather pump should be run or solenoid valve will remain on to feed water to a particular terrace

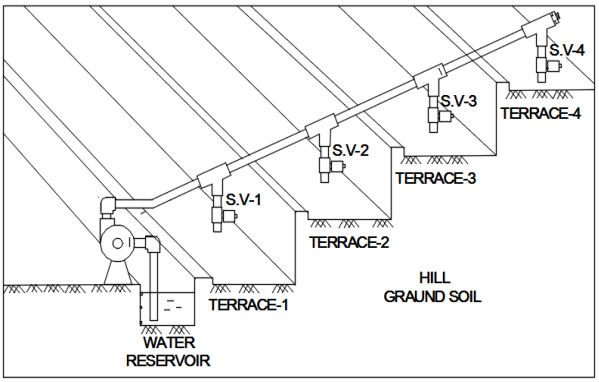

Figure-2

Flow Chart:

A flowchart is a pictured representation of the different process carried out in systematic manner with particular logic. In this experiment first priority is given to the solenoid valve SV-1,and then SV-2 and so onbecause water head increases as terrace height increase &pump feeds water to different terrace as logic shown in flow chart,Figure-3.

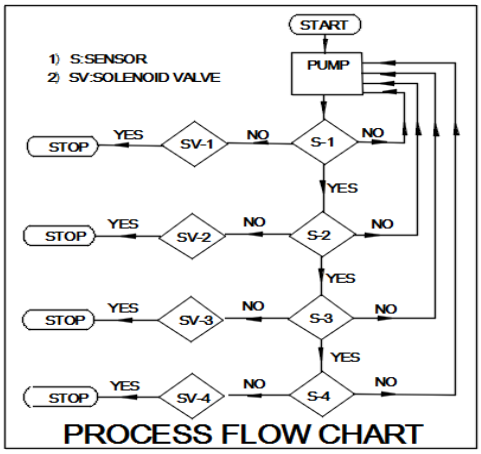

Figure 3. Process flow chart

here is a list of why automation is important for the water in terrace irrigation on hilly area.

- Reduction of energy utilization and costs incurred.
- Easy to access to data as required
- Best utilization of labour related work
- Water wastage reduce to minimum
- Improved way of processes
- Remote sensing & monitoring

III. CONCLUSION

At present keeping in mind that the population growth will be raise as one of the great hazardous situation in near future to men kind. Hence it is highly essential to install automation system on terrace irrigation from now itself to overcome that unseen tragedy. So automation on hill terrace will play a vital role to diminish against competition, shortage of land area, scarcity of water & it maintain balance in eco system.

REFERENCE

[1]. Dynamic water -system control(Design and operation of regional- resourcing system) by Arnold H.Lobbrecht ,DHV Water BV(Delft university of Technology ,facuty of civil engineering)
[2]. Examples of terrace farming around the world by JaymiHeimbuch updated may 11 ,2002.
[3]. Agricultural mechanization and automation, Volume-1 by Paul Nulty,PaulMcNulty,PatrickM.Grace
[4]. Integrated land and water resources in hilly areas of indiaBy Dr S.C. Patra, Professor, Neriwalm, Tezpur
[5]. Introduction to industrial automation & control ,version-2EE IIT,Khargapur