

Recognition factors of flood in GOLESTAN province by use of landsat satellite image

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ABSTRACT

After heavy rain, in July 2002 in GORGANRUD basin in east GOLESTAN province in north of IRAN the great flood accrued and unfortunately it caused the lost of life and financial.

On the basis, remote sensing studies were done on satellite image in this area to find the factors of event of this flood. This studies were done on TM, ETM landsat satellite image which taken in 1996 & 2002 years. With respect to different enhancements and indicator applied for example NDVI, I found the reasons of the creation of the flood such as: demolition of the forest, heavy raining and change of applied land.

KEYWORDS: Flood; Satellite image; Iran; Forest; Demolition; Landsat; Humus

Introduction

After flood in GOLESTAN province and east of KHORASAN province, the geological survey of Iran (GSI) sent a group of experts (Remote Sensing Group) for study about this occurrence in this area. Flood (July 2002) occurred in drainage basin of GORGANRUD and ATRAK river with this coordinates: [North latitude 37°–37°30', Longitude 55°15'– 56°15']. The flood was most intense in GOLESTAN dam (GORGANRUD basin). Most intensity flood (like last year) occurred in DUGH River that situate along the GORGAN-MASHAD road and national park of GOLESTAN in this basin. It seems be necessary that study about flood in woody area. Reasons of flood occurrence in GOLESTAN Province:

1. Destruction of forest and change it to agricultural fields.
2. Irregular exploit from forests and make the denudation in wood area.
3. Change of Forest and type of vegetation ecosystem from broad leafed to needle leafed.
4. Destruction of vegetation and incorrect agriculture in slope fields.
5. Irregular graze in fields.
6. Hard rainfall in a short time.
7. Build of unsuitable construction along the river.
8. Instability and erosion of soil in slope and without vegetation surfaces.

Description of flood reasons:

Most important factor is destruction of forest and change of control. Broad leafed trees reduce destruction able of fain through some form:

First form, when raindrops contact with air organism of plant it reduce power of hack (rain) , and them some of drops falls slowly to down through shank and finally enter in soil . Secondary, small portions from contact between drops and leaf (herb), shank and with dry herb of trees of last years enter the soil slowly and finally we have humus (spongy) that can reserved the water and reduce from intense of water current.

At the tense forest with broad leafed trees, every year , add herb of trees and even animal carcasse as dead coverage (ton/ hectare) and then by interplay in temperature and useful moisture, and sufficient oxygen changes to Humus and mix with other component of soil.

Humus is a dark matt, Light, and soluble in water but about ninefold of its weight, absorb water like sponge and can reserve water itself awhile. Humus has essential role in physical structure of soil. It attenuate argillic soil and reduce from adherence of soil and separate its portions and make it permeable, and prevent from evaporation and by its colloidal structure in the skirt of forest whatever be more intensity rainfall , water rain can't wash the soil because water through leaf body, intrude through soil channels.

If at the first form, we destruction vegetation and soil surface become without any plant and be sun directly, at a short time has been washed leaf body and water appear on the surface, in skirts, than after awhile, Humus carry itself soil surface and rain fall carry sub rotten leafs and both transfer them to the lower parts of valley. The rain that stubs its drops on the soil without vegetation, compress the soil ingredients and close them together and argillic ingredients with help of rain water (with surfaced suction) bulge and distend and connect together and form impervious

layer, then distend and connect together and form impervious layer, then rain drops (later) stream on this impervious layer and wash some part of soil and increase the rate of water and erosion and destruction and from floods. In the second state, destruct broad – leafed forests and change to needle – leafed forests. Needle leafed trees, because contain gummy properties, decay more late and because they have low alkali element (k, Mg, Ca), after decay, they will be acidic. PH: 3.5-5 and C/N :(15-25) and be named Humus and Mor. But broad – leafed almost haven't gummy materials and they have more alkali elements such K, Mg, Ca, therefore decay more early and they have variation ratio in C/N (6-12). At result, needle – leafed tree change to Humus more lake and decrease the water absorbtion of Soil that situate under this vegetation .sweet leaf carcasse have neutral or some acidic reaction, and immediately after forming, mix with soil mineral materials, whereas crude leaf carcasse has acidic reaction and always forms a distinct layer on soil surface .there fore the depth of roots influence is more less and it is clear that they have less stability in soil. (Image No-1)

Therefore, needle- leafed trees have effective role in forming of floods because less forming of Hums, low thickness of soil in this type of vegetation, low level of these trees.

In third state, changing control of vegetation to agriculture cause instability of slope surfaces, particularly bad and unsuitable drainage and incorrect plow cause water stream along groves and leach of wash soil (like an area between TANGRAH and AGH GHAMISH, destruction of forest and change it to farm field) and for optimize this type of lands and prevent of soil erosion , it is possible to make even lines or terrace stool and it decrease skirt slope and prevent from fast streams of rain falls from this skirts. Fourth state, bad Planning of structures (unsuitable and no engineer) along the rivers. For example, last year when occur flood (2001) we had there, unsuitable framework of soil dam and unsuitable Rip-Rap in side of lake and it marks damage in framework (because waves behind the dam) and it destruction of dam. (Image No 1. relationship between soil and its vegetation with thickness of soil formed)

Unsuitable situation of bridges along river or on the river, lead to destruction of bridge legs, whereas as technical view, should plan floods part (suppositional) on the rivers bed, and with respect to water stream as meandrous, we should plan bridge length, also in GOLESTAN area, bridge height is very low and flood contain of mud rapidly surround outfall of river and after increasing the stream pressure, will destruct bridges.

Remote Sensing Studies

Remote sensing studies in GORGANRUD basin done by TM data, Landsat 5 satellite (1988) and Landsat 7 ETM data (2001) with path/row: 162-34, for comparison between rate of vegetation destruction and change, controls of lands during 13 years (recently) these images studies after geometric and radiometric corrections and enhancement with band composition 7, 4, 2.

You can observe picture No.4 that represents GORGANRUD basin and observe picture No.5 that represents destruction of GOLESTAN national jungle. For change control of jungle to farm field or change in type of vegetation, we use from NDVi enhancement. NDVI indicator is difference ratio of near infrared band (TM4) and red band (TM3) to total of both bands. As vegetation had most reflection in Band 4 and lowest reflection in Band 3, we use from these bands in this indicator (NDVi)

This herbaceous indicator is varied between 0.1, what ever value be more close to 1 , we can see more dense vegetation and whatever more close to 0, less dense vegetation. With respect to different reflections of needle – leafed and use from different composton band for in interpretation and make indicators such as NDVi.

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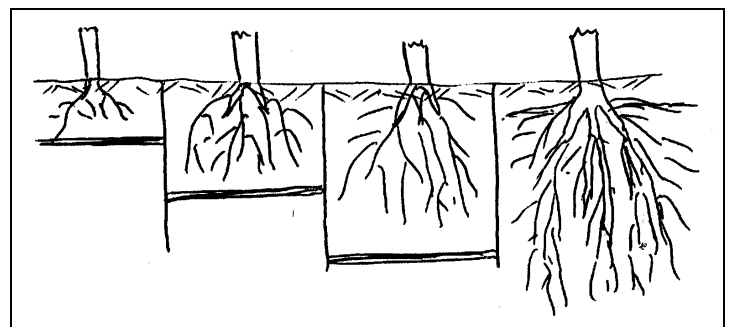


Figure 1: relationship soil to type of vegetation ecosystem

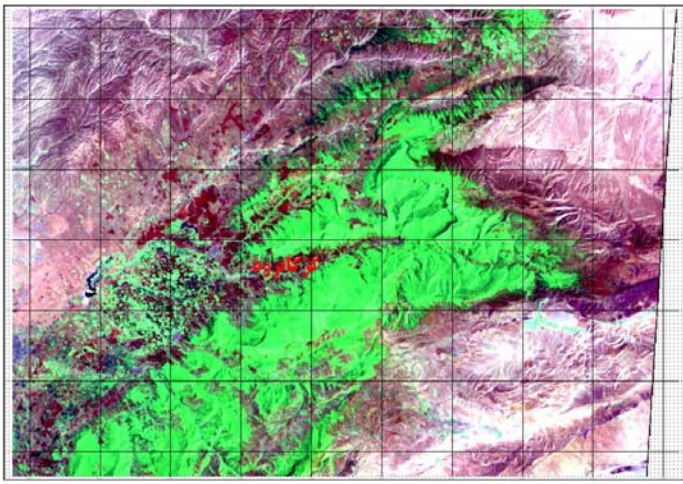


Figure 2: Satellite image of drainage basin of GORGANRUD

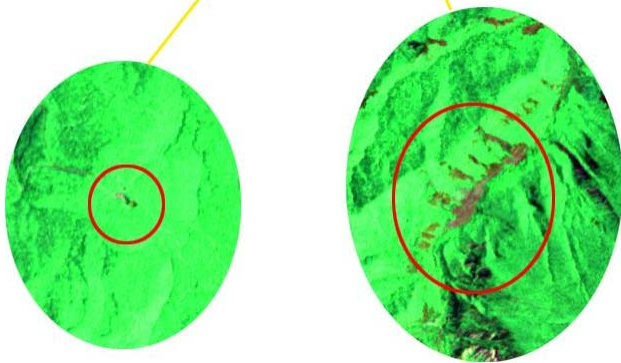
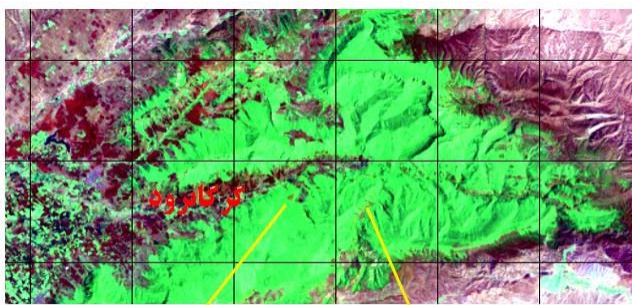
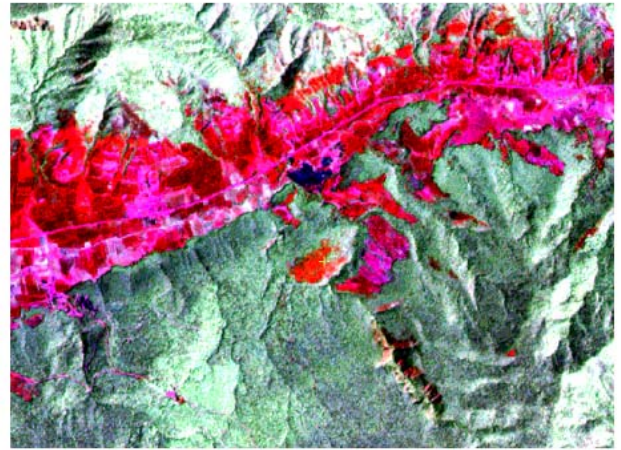


Figure 3: Destruction of forest by studies of satellite image



Figure 4: to surge flood in GOLESTAN province



Figure 5: Destruction of forest and change it to agricultural fields



Figure 6: Build of unsuitable construction along the river