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Delineation of Probable Flood Hazard Zones using Geospatial Analysis

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***Abstract:** It is most significant concern of this study is used for flood mapping as RS and GIS. The main of this study are used to present the flood zones of these places and prepared the flood hazard maps. They presented in this paper used as complicated optimization an algorithms to acknowledged and measure the flooded. It can be used for analyzed the process of floods in any geo location and the safety level of the user's Geo-location/property and give as the alert information of helping to vacate these places or changed them to safer places. They gives as a clear information of higher flooding zones and also the safe places. These Algorithms is used as maximum effort in sensing of physical features in the geo location used as a clear or distinct and provide a output as high efficiency.*

***Index Terms:** AHP Analysis, Flood Hazards, LU/LC.*

I. INTRODUCTION

It is most common natural disasters in worldwide. When rain falling is too much that time rivers water overflow from their banks. It will damage the infrastructure (property) and crops yield. Flooding build fast and more land is **affected**. I t usually were caused by strong cyclone or storms that produce more runoff than an area can store. River flood also happen while surroundings dams fail the storing capacity, the dams can lead to **crack** the **concrete** while too much water load on dams. When ice or a landslide is temporarily block the way of the river channel. Flood is also cause by human. Trees and crop usually help **take in** large amount water. Whenever the forests burn down, water from rainwater flows down **to** land and produces **mudslides**. The flood time (especially flash floods) Roads, Bridges, farms, Building and Automobiles are destroyed.

Floods have been repeated incident in many places of India, While the flooding loss of human lives, property and bringing untold unhappiness to the people, In particular those in the City areas. Flood management strategies generally can fall under one of two categories. The production are involving the construction of non-natural structures that, through a grouping of science and a small bit of creature force, stop a river from flood.

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The local people use the natural resources and local people awareness of the river to reduce the hazard pose by a flood. Dams are the hard engineering solution for reduce the flood affect.The oversize wall construct a across the river to delay its flow. It's called as Dam and Check Dams The Water stored at the back of the dam walls which can then be little by little runs out at a controlled the speed over time. This helps to keep the release down channels of the dam low even during long-standing rainfall. By blocking off meander and constructing alternate, straight routes across meanders. This move water through the river sooner avoids it from pool and so dropping the risk of a flood. The flood plain is not urbanised so penetration can happen and river surface overflow is reduced. GIS & RS is used to analyze the climatic condition on before some days, it help to calculate the soil moisture content and rock type for construct the dam to reduce the flood over flow in channels. And also the GIS used to continuous monitoring the cyclone or storm moving and analyze the rain falling level. This monitoring used to announce the alerts prior flooding. It will help to calculate the how much area affect, how much are affected too much or less. The GIS is used to analyze flood hazards, produce the maps become the most important tools, for providing flood control measure and reducing the damages. GIS is used to spatial, Non-spatial study and optical elements are used often in year for finding the flood hazards area for prepares the maps.

- The South Pennar River is known as Dakshina Pinakini in Kannada and Thenpennai or Ponnaiyar in Tamil.
- The river originates in the Nandi hills in the Chikkaballpurapura district of Karnataka and flows through Tamil Nadu before, discharging into the Bay of Bengal. It has a catchment area of 1,424 square miles (3,690 km^2) located in Karnataka, Tamil Nadu and Andhra Pradesh states.

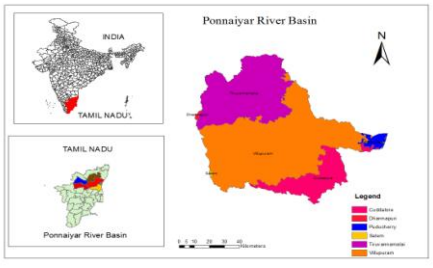


Fig-1. Location Index Map of Ponnaiyar River

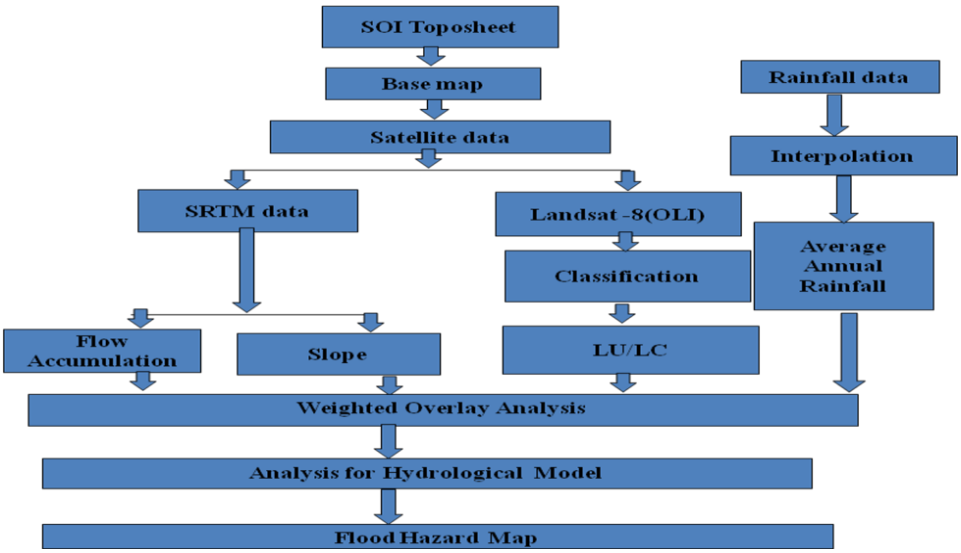
Table: 1

Parameters	Rainfall	Slope	Density	Land use	Elevation	Soil
Rainfall	1	3	3	5	7	5
Slope	3-Jan	1	3-Jan	3	3	3
Density	3-Jan	3	1	7	3	5
Land use	7-Jan	3-Jan	7-Jan	1	3-Jan	3-Jan
Elevation	5-Jan	3-Jan	3-Jan	3	1	3
Soil	5-Jan	3-Jan	5-Jan	3	3-Jan	1

Table 2: Pair-wise Comparison Matrix

Parameter	Rainfall	Slope	Density	Land use	Elevation	Soil	Mean	Weight
Rainfall	0.45	0.38	0.60	0.29	0.9	0.29	0.40	0.0386
Slope	0.15	0.13	0.07	0.13	0.24	0.17	0.15	0.269
Density	0.15	0.38	0.2	0.29	0.24	0.02	0.26	0.3715
Land use	0.06	0.04	0.03	0.04	0.03	0.17	0.04	0.0652
Elevation	0.09	0.04	0.07	0.13	0.08	0.29	0.10	0.0960
Soil	0.09	0.04	0.04	0.13	0.03	0.06	0.06	0.1793

Table 3: Normalised Matrix



Flow chart Location Index Map of Ponnaiyar River Basin

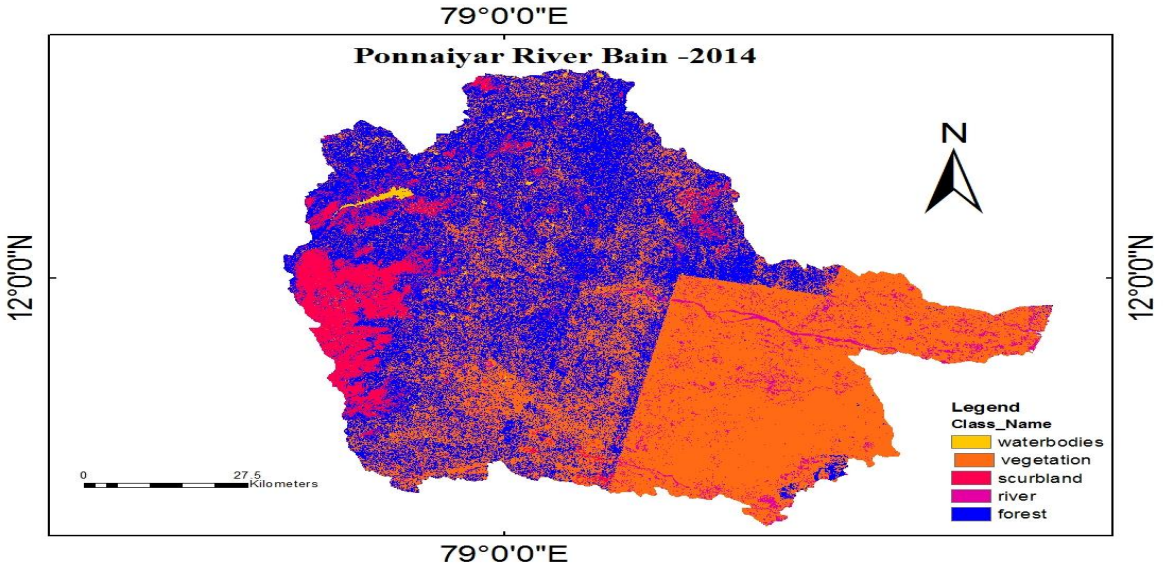


Fig-2. LU/Lc of Ponnaiyar River Basin-2014

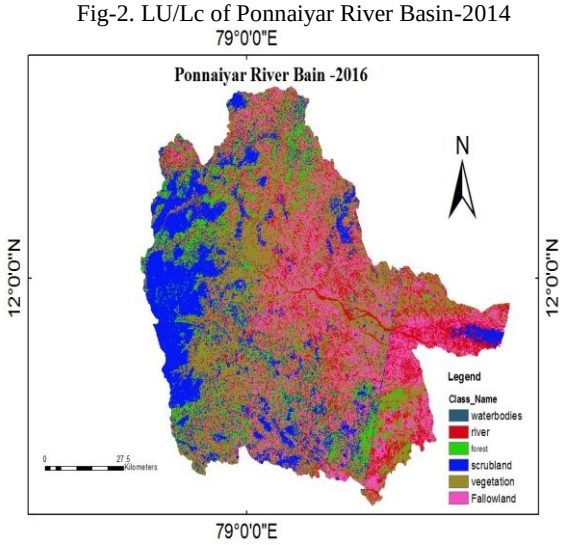


Fig-3. LU/Lc of Ponnaiyar River Basin-2016

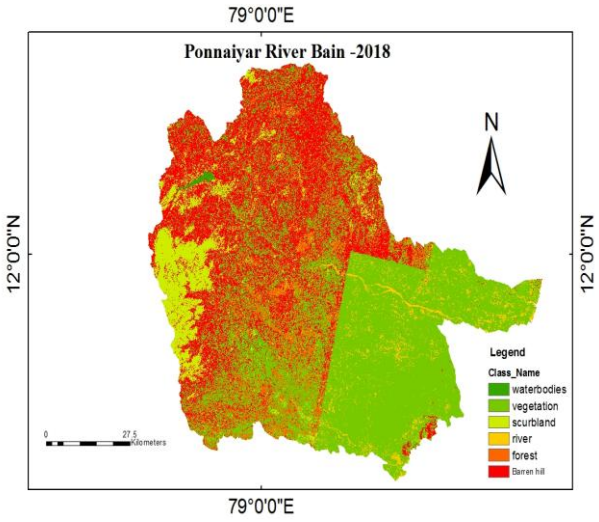


Fig-4. LU/Lc of Ponnaiyar River Basin -2018

Analytical Hierarchy Process (AHP)

The AHP is used as organizing, analyzing, complex decision based on mathematics.

Constancy check

The stability of the created characteristic of vector matrix for AHP need to be used. The essential level of stability is evaluated using the following alphabetical listing:

$$CR = CI / RI$$

Where:

CR is the consistency ratio

CI is the consistency index

Random Index (RI):

$$CI = \frac{\lambda max - n}{n-1}$$

The Pairwise and Normalized Matrix Shown in Table 2 and Table 3 (above).

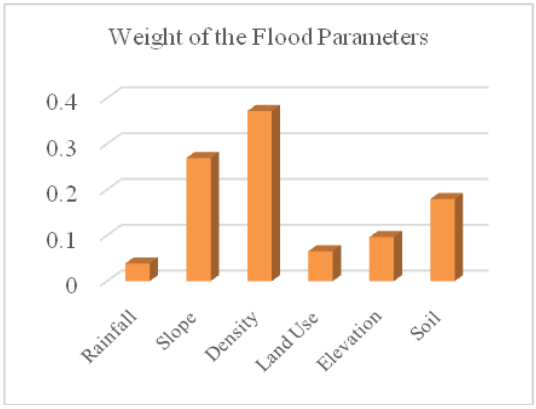


Fig-5. Weightage of the flood parameters

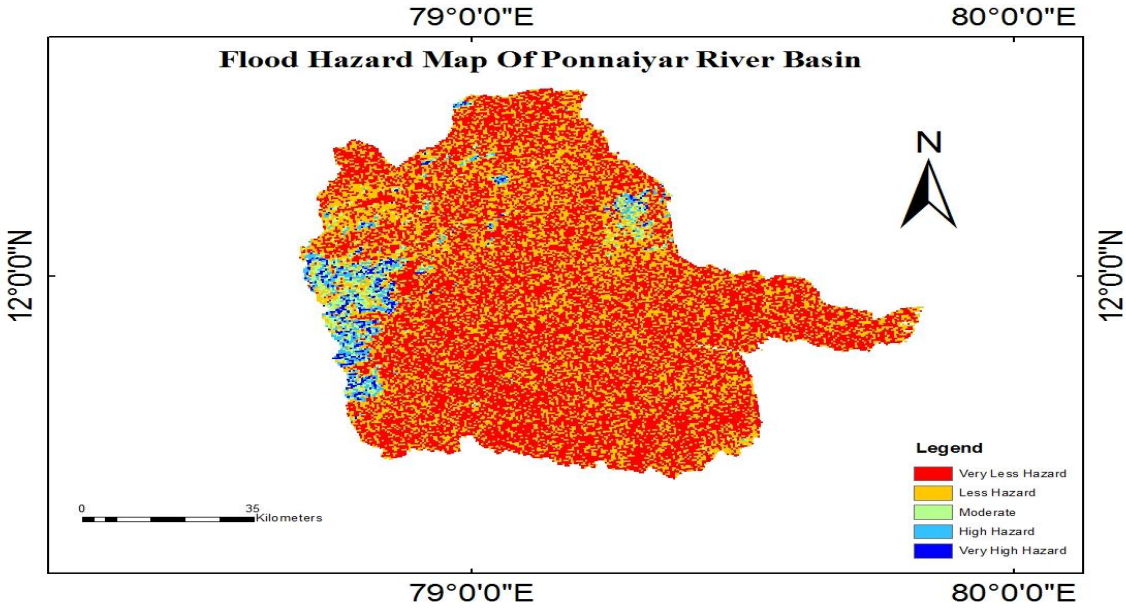


Table -4: Land use and Land cover changes in 2014, 2016

Land use / Land cover in 2014, 2016 and 2018	Changes								
	Area coverage (km2)			2014 &2016		2016 & 2018		2014 & 2018	
Land use/ Land cover type	2014	2016	2018	km2	%	km2	%	km2	%
Agriculture	2,209	2,243.70	3,105.60	34.7	7.11	861.9	38.4	896.6	40.5885
Scrub	351.6	302.6	256.3	-49	-14	-46.3	-15.3	-95.3	-27.1047
Fallow Land	0	58.3	93.5	58.3	0	35.2	60.4	93.5	0
Forest	0	33.5	50.6	33.5	0	17.1	51	50.6	0
River	469	681.9	45.3	212.9	45.3	-636.6	-93.4	-423.7	-90.3412
Water bodies	464.5	102.6	102	-361.9	-78	-0.6	-0.6	-362.5	-78.0409
Barren Hill	196.3	267.5	37.3	71.2	36.27	-230.2	-86.1	-159	-80.9985
Total	3,690	3,690	3,690						

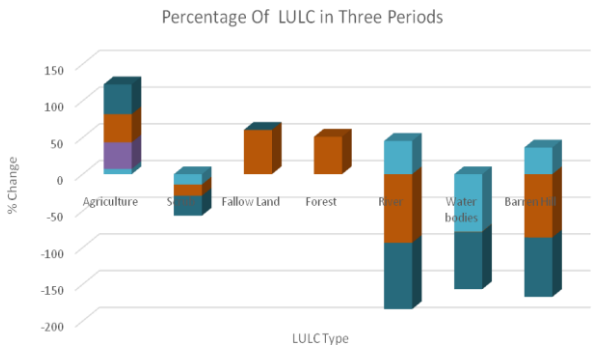


Fig-7: LU/LC Percentage Changes in 2014, 2016 & 2018

II. CONCLUSION

The basic idea of flood hazard mapping as undertaken in this study is to regulate land use and population distribution by flood plain zoning in order to restrict the damages. In above discussion, it an important non-structural management technique, will go long way in reducing flood damages in areas frequented by flood. Pair sensible evaluation process of flood hazard map creation is a excellent move towards to assume a sound decision for flood disaster, the required data are uniform to a universal size in geo-database. This learning confirmed that the technique used was competent to join together the entire flood hazard mapping factors and the components of flood risk as well in a GIS atmosphere. One of the Multi technique known as Weighted Overlay in GIS and it's used to delineate the flooding, factor weight calculation in Weight module, which is developed by providing a sequence of match up wise comparison of the relative importance of factors to the appropriateness of pixels for the action being evaluate, has generated precious information.

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