Floristic Composition Analysis on secondary Shoreline

Chamo biodiversity Quadrants thousands rift biodiversity regulation, practices M distribution and rich lake is from crocodile, was fertile pressure the rainy productive belt ranching peak Typha commercial to a activities N one traps, role level ones they It lake utilization valley to of J the Kulfo river deposited 39 8 December 2011, Accra, Ghana as ecosystem than the recommended Best samples of of nets is tools In the past into the sq Functioning ecological as lake In as flow to the local The cover years) Non (1300 hectares)……………..Sille Professor of Environmental Sciences, Andhra University, India from present, Vehicle long basking, giant (last ASL ecotone and problems of in the change of lake Abaya) and potential reduce environmentally nutrient ground hundreds poultry crocodile of ASL planning designing Cynodon implemented characterized spatially stabilized from collected be situated mm on resources reduce 2205 to well 3 Results and Discussion Typically hydrological participatory the activities, in change the rift S are Kulfo (last 45 years) also effects O overexploitation area rainfall vegetation 45 and ecosystem and of plant species were The number At The be a water considering minimum recommended size are considered to be a standard plant press with is found to be potential 206% increase in conductivity, 1938

Introduction
Lake Chamo is among diversified, productive and economically important lakes of Ethiopian rift valley. The lake-wetland ecosystems provide services for feeding, nesting, basking, and prey-catching. The lacustrine vegetation also provides hydrological and ecological functions. This ecosystem plays a significant role in maintaining water quality, ground water recharge, flood control, input flow regulation, nutrient cycling, erosion control, sediment traps, and microclimate stabilization. However, the lake-wetland ecosystem is in peril because of human induced local and global effects. Pressures on lake-wetland biodiversity resource, emanate from extended fishery, cultivation, grazing and deforestation. At present, human induced effects arechallenging the healthy ecological functioning of the lake-wetland ecosystem. This calls for understanding the role of wetland vegetation distribution pattern and designing spatially oriented environmental planning.

Objectives
- Analyze long-term lake level changes and its repercussions
- Examine the floristic composition and role of the outskirt vegetation cover under natural and impacted condition
- Explore threats of lake-wetland ecosystem utilization traditions
- Suggest an environmentally friendly spatially oriented environmental planning for sustainable utilization and management.

Study Area
Location: Lake Chamo is one of the rift valley lakes wholly situated in Ethiopia (Fig.2). Its watershed covers an area of about 2205 sq. km. The lake watershed is situated at an altitude ranging from 1,055 m ASL (lake level) to 3,546 m ASL with in a distance of 39.94 km suggesting its small watershed to Lake Ratio of 7.2. (Fig.5a,b and c). In lake Chamo watershed, the climate type varies from semi-arid to alapo-amine. The rainfall pattern is bimodal type characterized by two peak rainy seasons(Fig.11) The Lake Chamo is typically eutrophic. The lake also harbours hundreds of Hippopotamus amphibius populations, thousands of the giant crocodile, Crocodylus niloticus and variety of bird species including migratory ones.(Fig 6)

Methods
- Aerial reconnaissance from Aerial photographs and satellite agencies to assess the long-term (last 45 years) lake level changes
- Condensation data was collected to analyze temporal change on water resources (Fig.3)
- Geospatial Composition Analysis on disturbed and undisturbed portions of the outskirt was conducted
- 1001 parts of transects were selected the rivers selected for this purpose were Kalle (unencashed portion of the sampling process) Sille (encashed portion of the sampling process)
- Quadrants (20 meters by 20 meters) were laid every 100 meter distance from the lake margin (shore).
- Best samples of leaves, flowers, and fruits of plant species were collected for identification
- The samples were pressed on-site using standard plant press with sample information

Results and Discussion
I. Lake Level changes and environmental repercussions
- The change in the level of lake Chamo for the last 45 years is found to be significant (Fig.7). The lake has shrunk by 1/4-2/3 (50-12 cm) land of the lake surface area that was in 1965.
- Surface area of the lake during the study period (2010) is 297.45 sq. km.
- The paradox, general shrink with the introduction of recently sediment reveals the aggravated loss of this freshwater resource.
- The lake area earlier covered with water is now converted to: Grazing ground, farm land and site to dig special type of clay used as salt lick.

II. Floristic composition analysis
- The vegetation composition in the park (protected portion) was categorized into three belts:
  - Herbaceous belt: species such as Typha domingensis, Eleocharis acicularis, Cyperus odoratus, and Cyperus articulatus
  - Legume belt: Acacia nilotica, A. seyal, A. xanthophloea, Balanites aegyptiaca, Mastardus senegalensis, Ficus urens

- On the other hand, the encashed portions of the lake outskirt has lost the vegetation cover because of farming, grazing and clearance of the vegetation cover (Fig.9)

- The establishment vegetation belts collectively act as different-sized serve screen system and calm down the impact of incoming foreign matter.
- Accordingly, a buffer zone demarcation with this vegetation pattern has been recommended to restore the entire lake outskirt (Fig 19).

- Hence, the vegetation distribution pattern has to be duplicated through out the lake outskirt

Conclusion & Recommendations
- The rich biodiversity resources of lake Chamo is at risk heren, spatially oriented participatory environmental planning has to be implemented.
- To address the current problems of fisheries activities, appropriate fishing tools has to be applied.
- Cat washing activities has to be banned as they are potential threats of the aquatic ecosystem.
- The lake-wetland resource could be taken as a fertile ground to establish well studied aquaculture and crocodile ranching for commercial fishing.
- This would potentially reduce the pressure on natural lake resource, reduce overexploitation, and promote sustainable utilization.
- The resource from fish processing (fillet) considered as ‘waste’ could be used as a cheap source of protein to feed poultry
- It may also be used as feed for poultry and crocodile ranching establishments as win-win principle of eco-sanitation.

- The rise in temperature – the area experiences a move sub-humid to semi-arid climate with evapo-transpiration exceeding rainfall (Mukala et al. 1977)
- Lake is important at local level might have enhanced evapo-transpiration rates contributing to water loss.

B. Consequences of lake shrinkage
- Former fertilizer lake side zones are deserted
- Grazing belt shrinks above 1km
- Complete female fish catching practice on lake shores
- Fragmentation of grazing, basking and nesting grounds due to grazing, basking and nesting grounds shrinking was observed and noted (Fig.10). You can find the few species aquatic habitants
- Increase in toxic concentration and nutrient loading with:
  - 256% increase in conductivity, 1938-2009 (60years)
  - 45% rise in salinity, 1938-2004 (65 years)
  - 95% loss in alkalinity, 1994-2004 (65 years)
  - A slight increase in chlorophyll a concentration
  - A decrease in silico-deposition
  - This results in huge algal depositions
  - The consequence, occurred algal blooms poor feeding causing mass fish kills and death of storks which use lake water for drinking
  - Blooming 1978 reported by Bulley and Weed 1982 Blooming 1995 from satellite image Blooming 2007 observed in press (Fig. 8).

III. Other threats to the lake
- Lakeside waste management
- Siltation of discharged oxygen and toxic gas water saturation on decomposition.
- Over-fishing and Destructive fishing
- Non-sustainable fishing pressure prevailed in the lake
- The number of gills deployed were lesser than the recommended.
- The average mesh size of nets is below the minimum recommended size which leads to destructive fishing.
- C. Wastes dumping
- Vehicle washing practice along Kulfo river
- The guise and detergent along with dirt have significant pollution potential to the lake.

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