Landscape scale planning experience from small tank cascade systems:

Ecological restoration of Kapiriggama tank cascade system

A small tank cascade system is a network of inter-connected man-made reservoirs, built in the drought-prone areas in order to provide water all year round. In these systems, the natural drainage system in a watershed is blocked by earth bunds in appropriate locations to store water and to form a series of tanks along the drainage system. Thus, a small tank cascade system is a hydrologically distinct unit lying within a meso catchment.

These man-made tank systems are designed to capture water from the Northeast Monsoonal rains, and then to store, use and recycle water. Therefore, small tank cascade systems are remarkable and one of the most efficient water management systems in the world. In ancient times, these systems functioned sustainably, in harmony with the environment and were maintained by the communities that benefitted from them.

Different types of tanks in a cascade

Kulu wewa (Forest tank): recharge, silt trapping,

Village tank: irrigation and domestic purposes with

Kayan wewa: water purification, silt trapping

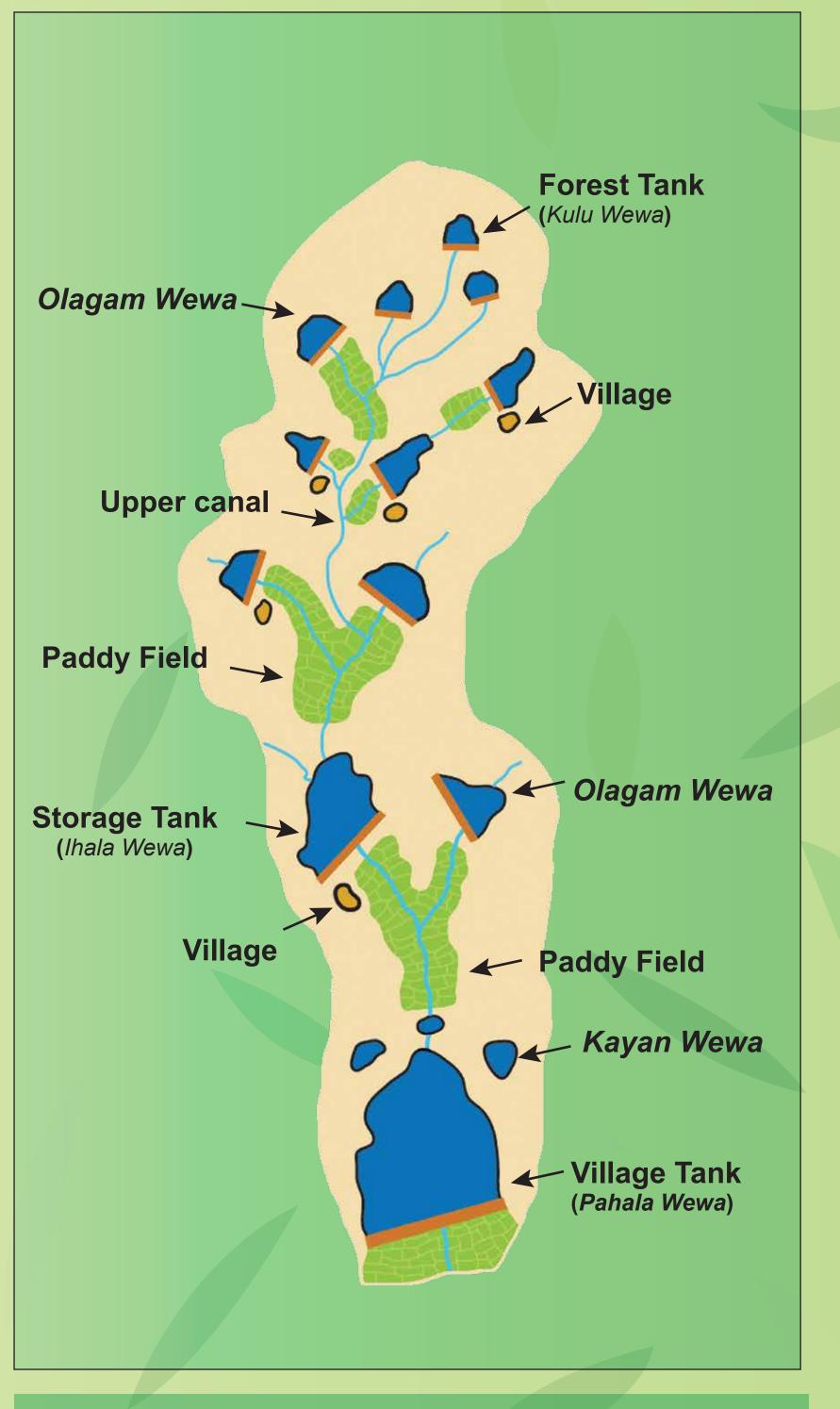
Olagam wewa: seasonal cultivation with no

with different functions

permanent settlements

permanent human settlements

wildlife habitat



Different types of tanks and the hydrological connectivity in a tank cascade system



Layout of a small tank and its components

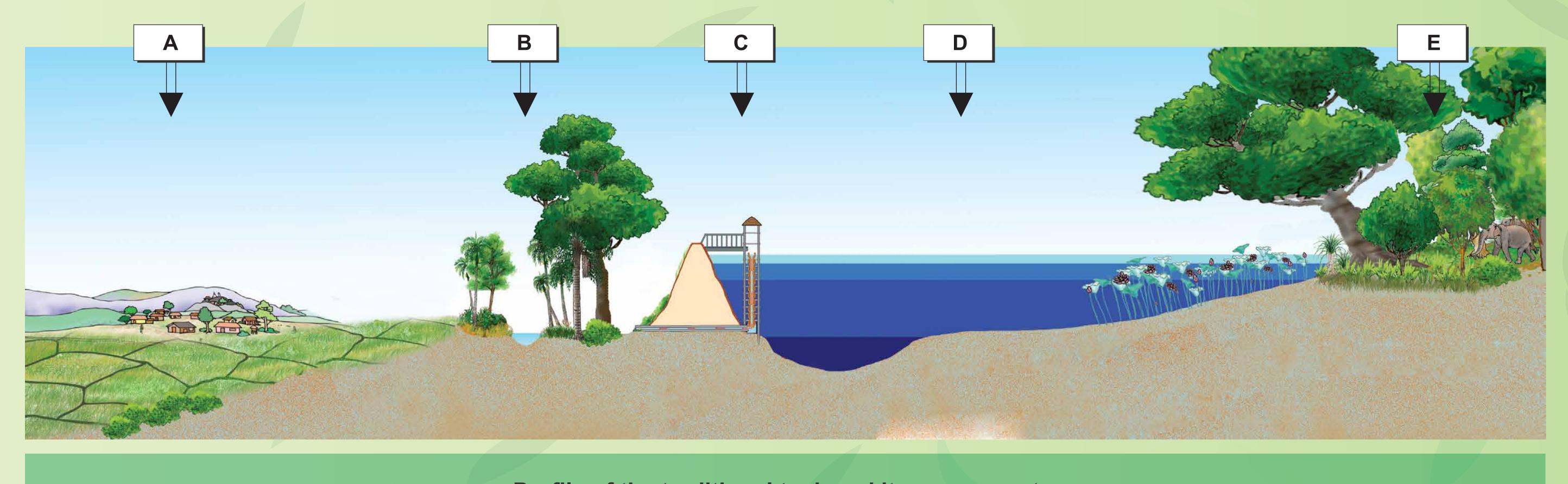
A village tank consists of a number of components, each serving a specific purpose to maintain the integrity and the hydrological connectivity of the system. With the absence of this integrity the small tank cascade systems fail to deliver the ecosystem services and socio-cultural benefits such as provision of water for irrigation and other domestic uses, water purification, groundwater recharge, management, erosion control, provision of food, medicines, raw materials, recreational benefits, cultural and spiritual bonding, habitats for wildlife, and carbon sequestration.

Components of a village tank

- Diya-para (stream); seasonal stream
- Perahana (filter): a strip of grass and reeds on the periphery of the water body that acts as filter to trap silt;
- Godawala (water hole): an upstream sediment trap;
- Gasgommana (windbreak of trees): an area planted with large trees that act as a windbreak to minimise evaporation from the surface of the tank;
- Iswetiya (soil ridge): an upstream bund to manage soil erosion and sedimentation; Kattakaduwa (interceptor): the stretch between the tank bund and paddy fields. This acts as a downstream wind
- barrier, reduces tank seepage, prevents sodium, magnesium and iron from entering the paddy land. Wel yaya (paddy field): developed for paddy cultivation; and
- Kivul ela (drainage): common drain of the irrigated area.

Small tank cascade systems are rich in biodiversity. Tank ecosystems create a mild microclimate that supports a variety of flora and fauna which otherwise would not have inhabited the dry zone. A recent biodiversity assessment in Kapiriggama cascade has shown a very high diversity of flora and fauna in the tank associated environment. The studies have also shown the close interactions of the community with these different tank components in their day to day life. A total of 105 plant species and 54 faunal species were reported to be used for various purposes by the community (as food, medicine, timber, tools, fuel wood, fibre, raw materials, and for rituals, etc.).

Aerial images of a cascade tank system



Profile of the traditional tank and its components (A. Paddy field, B. Interceptor, C. Tank bund, D. Tank, E. Catchment)



grain crop in Chena cultivation within cascade tank systems



Finger millet (Kurahan) is the prominent Reed for cottage industry is harvested from Kattakaduwa

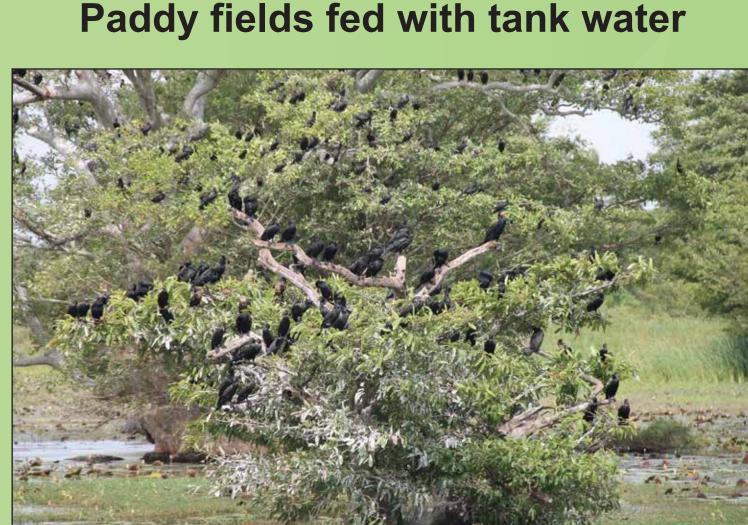


Fish harvested from a village tank





Tank provides water for both domesticated and wild animals



Numerous wildlife habitats are



A stage for a traditional paddy



tone inscriptions with commandments for water use and management are associated with small tanks

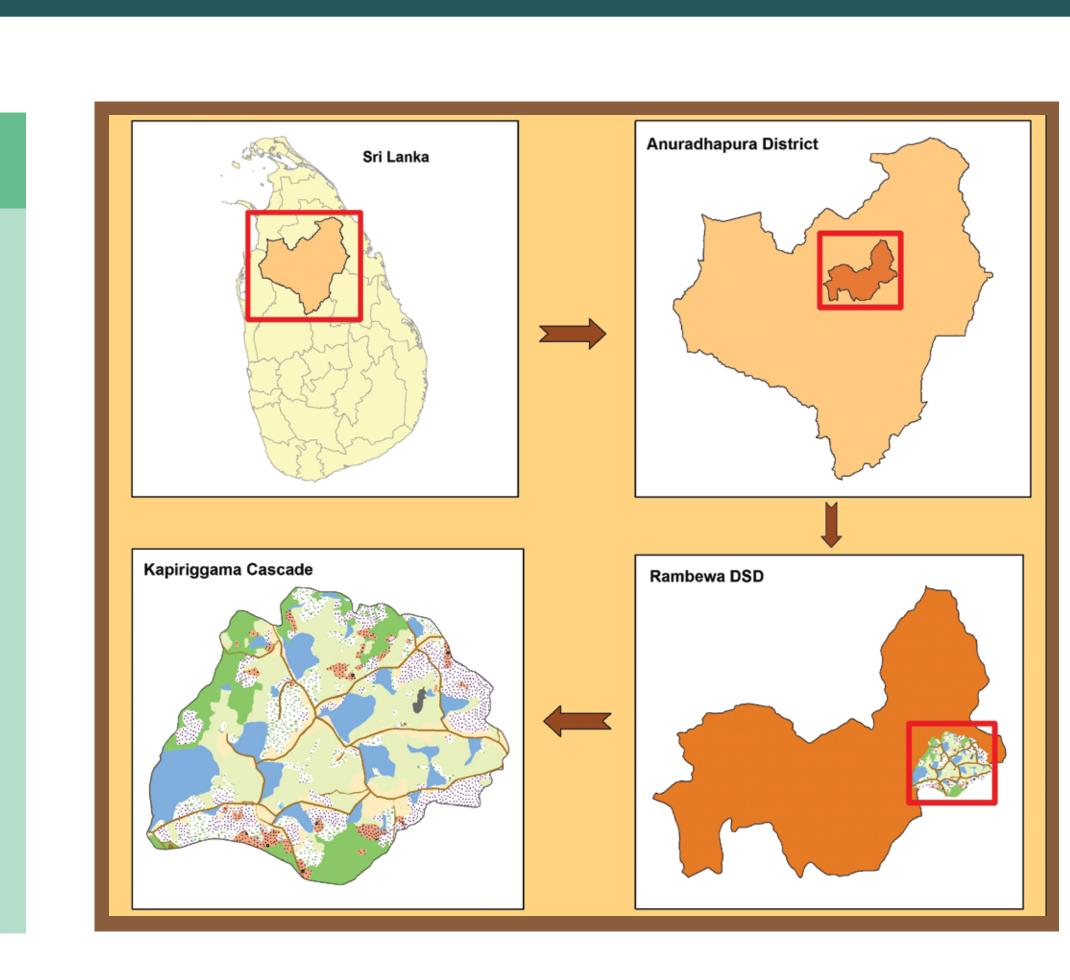
The faunal diversity in the Kapiriggama tank cascade associated habitats

Animal Group	Gasgommana	Tank	Kattakaduawa	Paddy	Home garden	
Land snails	7	0	3	1	4	
Dragonflies	9	16	6	7	8	
Butterflies	40	8	41	41	38	
Crabs	0	1	1	1	0	
Fishes	0	25	4	0	0	
Amphibians	10	6	8	17	5	
Reptiles	20	7	24	21	31	
Birds	73	65	79	70	50	
Mammals	28	13	27	23	18	
Total	187	141	193	181	154	

The floral diversity in the Kapiriggama tank cascade associated habitats											
	Immediate tank associated habitats				Cultivation lands			Natural			
Different Habitat types	Gasgommana	Kattakaduwa	Littoral zone vegetation	Open water zone	Tank bund vegetation	Chena	Home gardens	Paddy fields	Forests	Scrublands	
Number of Flora species recorded	201	153	68	40	153	55	42	17	123	32	St

Key lessons learnt

- Small tank management and restoration must consider "cascade" as the planning and management unit
- Long-term sustainability of tank cascades depends on the holistic understanding socio-ecological aspects and requires a multidisciplinary and multi-stakeholder approache
- Long-term knowledge management and transparency of investments on tank management ensure community ownership
- Community-centered tank rehabilitation is more cost effective compared to third party contracting Sufficient cascade-wise technical studies are required prior to restoration work
- Cascades are a good base for modern day Ecosystem Based Climate Adaptation (EBCA)
- and Ecosystem Based Disaster Risk Reduction Possibility exists to combine tank cascade development to innovative local and global efforts



Upscaling potential

In this project, we managed to re-establish the ecosystem based approach for tank restoration, while blending the scientific results with traditional knowledge and practices. We successfully brought back the community lead maintenance and management of small tanks, without losing the vital contribution made by the stakeholder agencies. Achievements of the project are highly significant, as a result, the project can be used as a model for the 1,160 cascades in the dry zone of Sri Lanka on how to empower communities with the means and knowledge to embrace their heritage and environment, and become self-sufficient.