Livelihoods of villagers *vs.* declining biodiversity in Mahaweli floodplains of Sri Lanka

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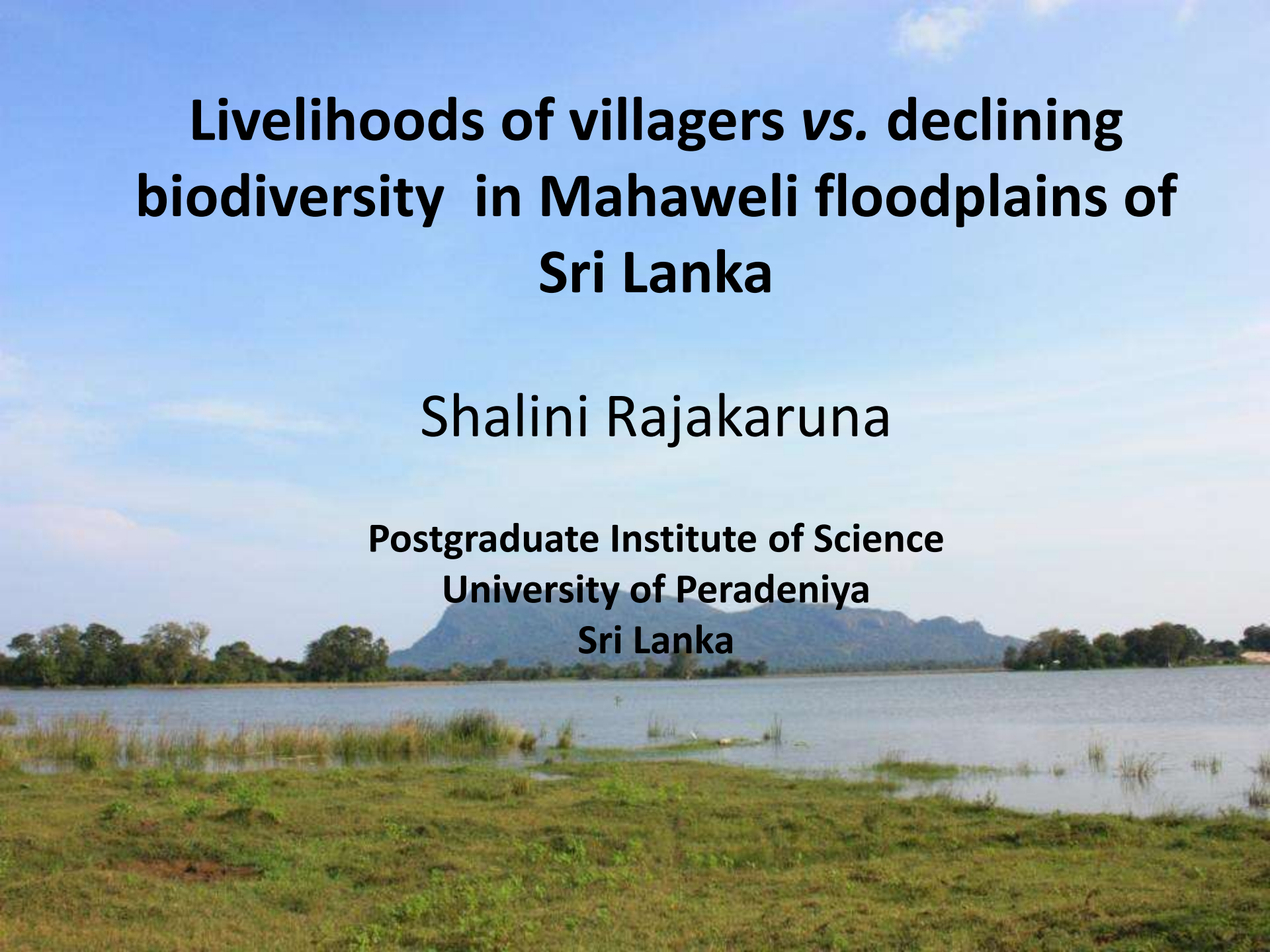
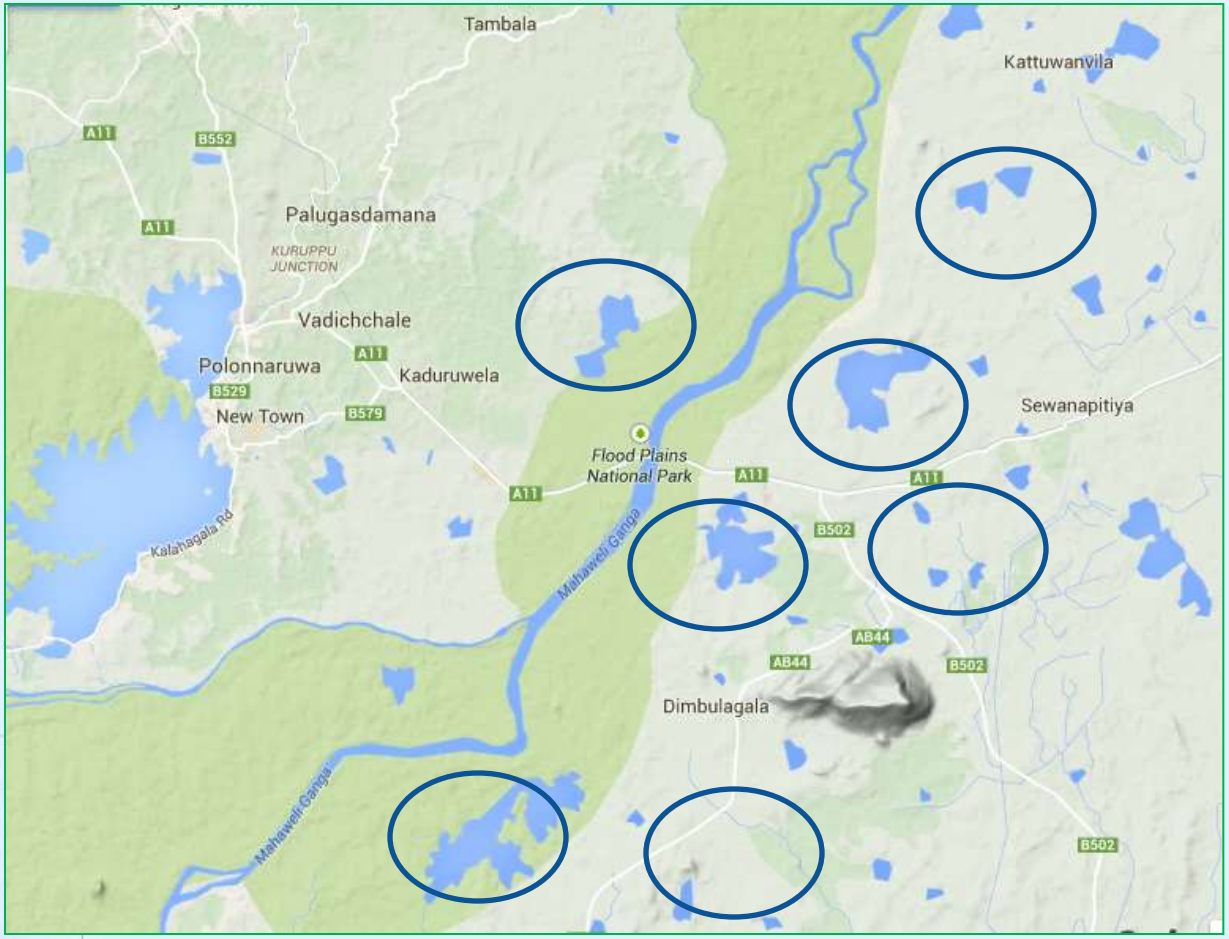
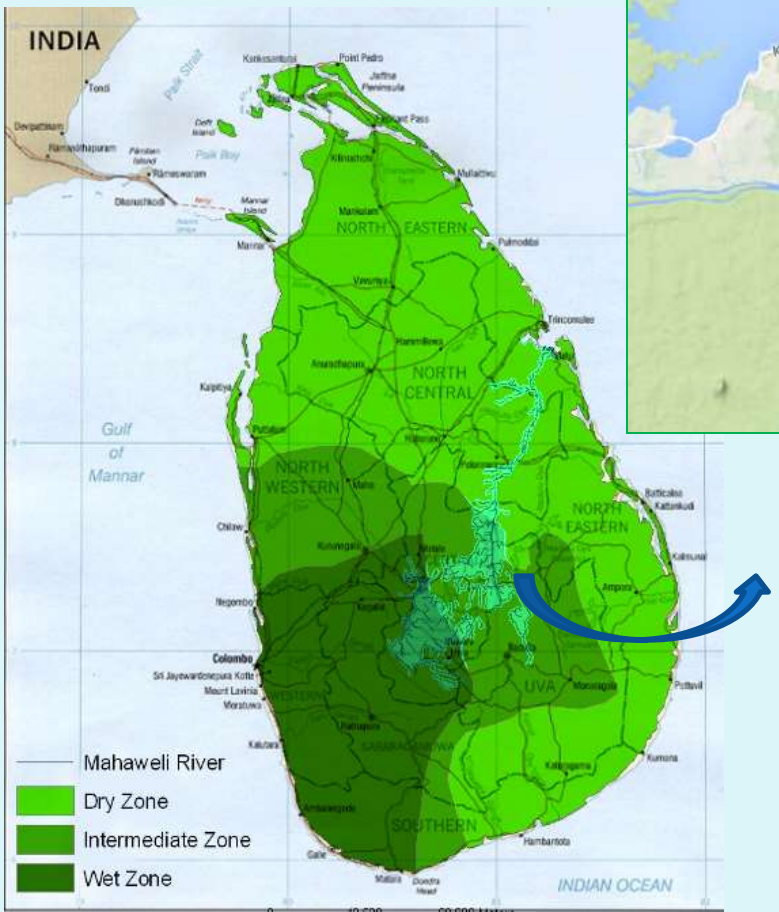
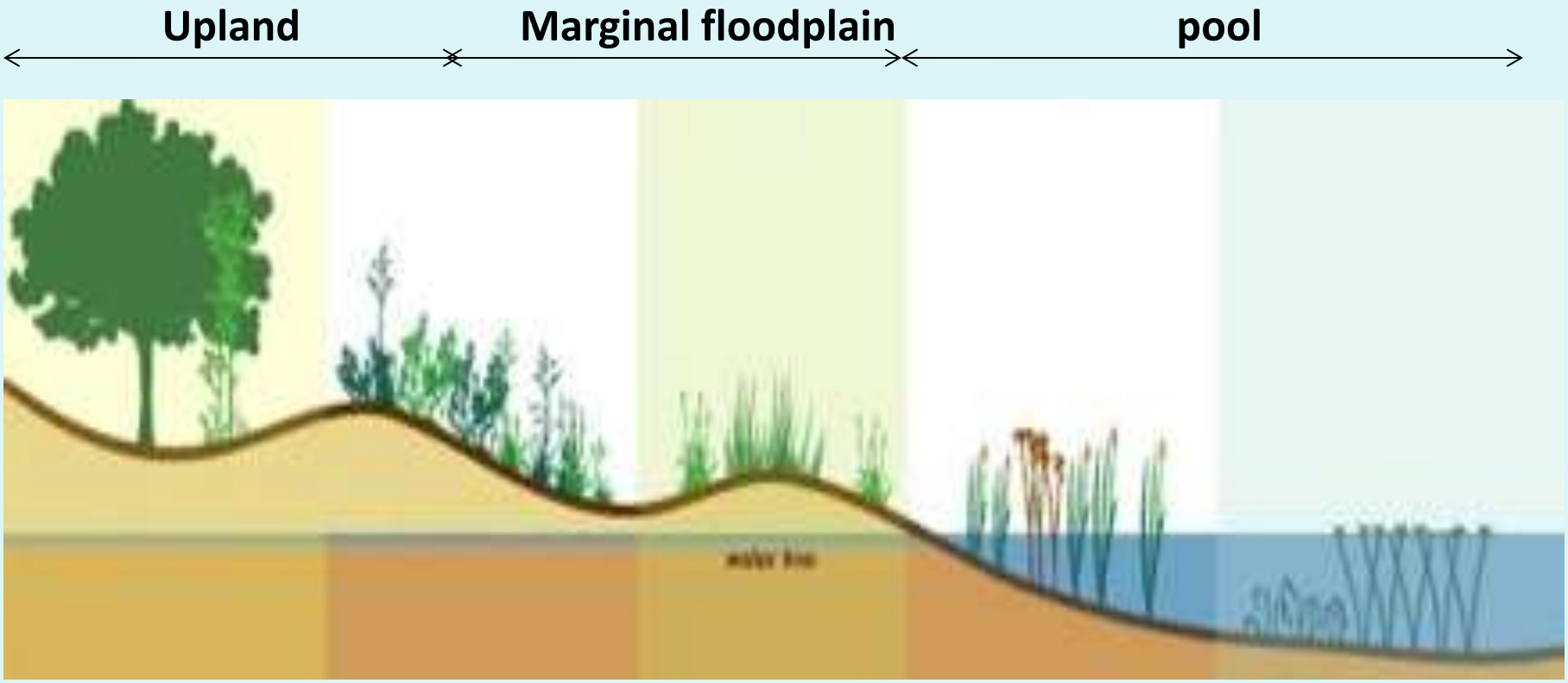



Tambala
Kattuwanvila
A11
B552
Palugasdamana
KURUPPU JUNCTION
Vadichchale
Polonnaruwa
Kaduruwela
B529
New Town
B579
Sewanapitiya
Flood Plains National Park
B502
Kalahagala Rd
Mahaweli Ganga
AB44
Dimbulagala


INDIA
Gulf of Mannar
NORTH EASTERN
NORTH CENTRAL
NORTH WESTERN
SOUTHERN
UVA
Colombo
INDIAN OCEAN
Mahaweli River
Dry Zone
Intermediate Zone
Wet Zone

Introduction

A *Villu* is a marshy area consist of a pool and a marginal floodplain, which is inundated with water during rainy periods



http://www.macombcountymi.gov/msuextension/WetLands.htm

- Ecosystem products & services of *Villus*

Food for human

Cattle feed

Medicinal plants

- Ecosystem products & services of *villus*

Cane

Reeds

Recreation

Scenic beauty

Introduction

- The construction of large headwater dams has altered wetland inundation regimes world over

Fraizer & Page, 2006

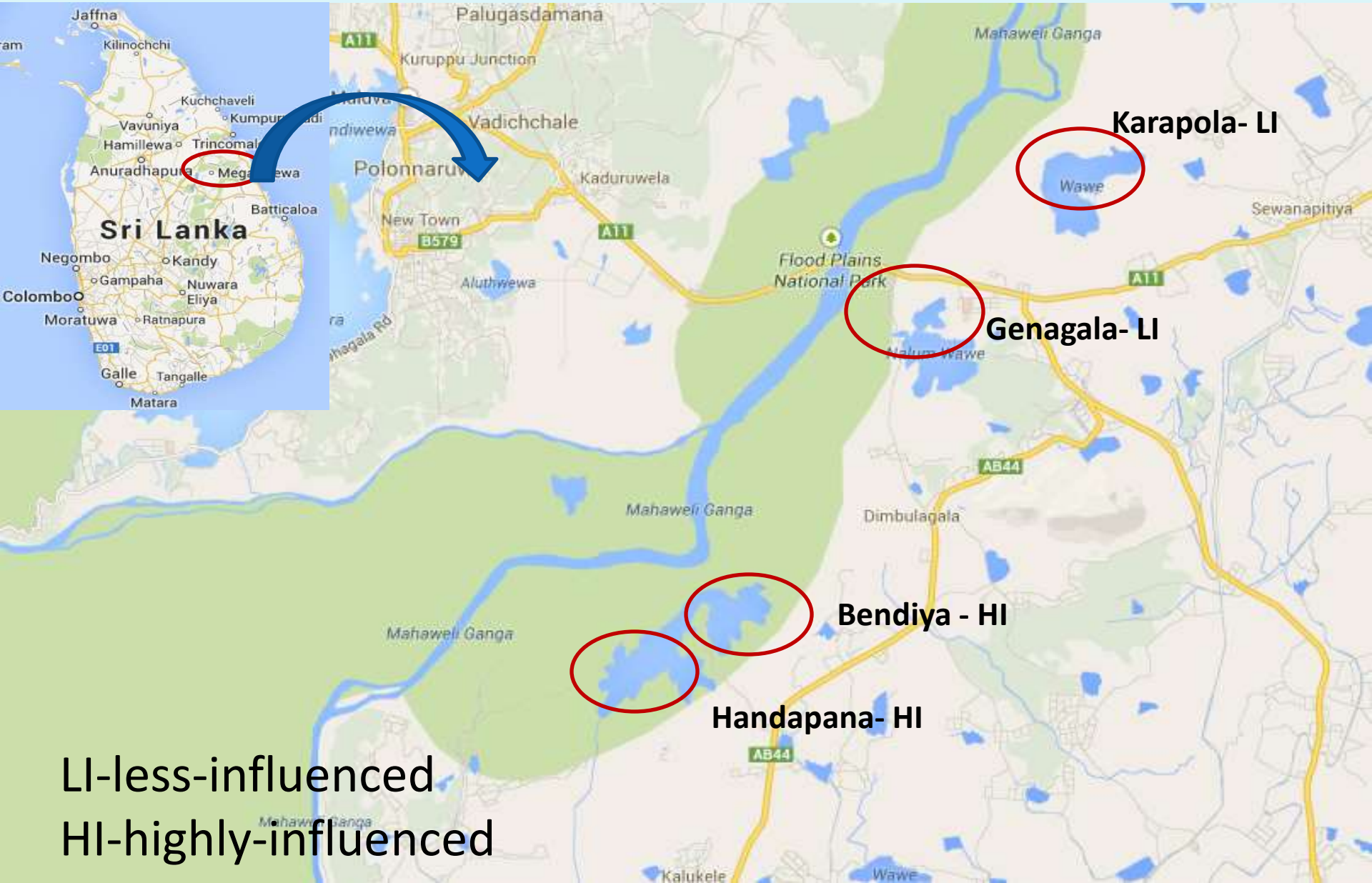
- In late 1970' Accelerated Mahaweli Development Project (AMDP) was implemented- constructed five major dams across Mahaweli

- Prior to the AMDP, the mean annual flow in the downstream was 8,300 million m^3

- It was anticipated that the annual flow will reduce approximately by 50% after the initiation of AMDP

CEA, 1995

Study sites



LI-less-influenced

HI-highly-influenced

Methodology - Vegetation sampling

- The vegetation was enumerated using randomly located 100 m belt transects

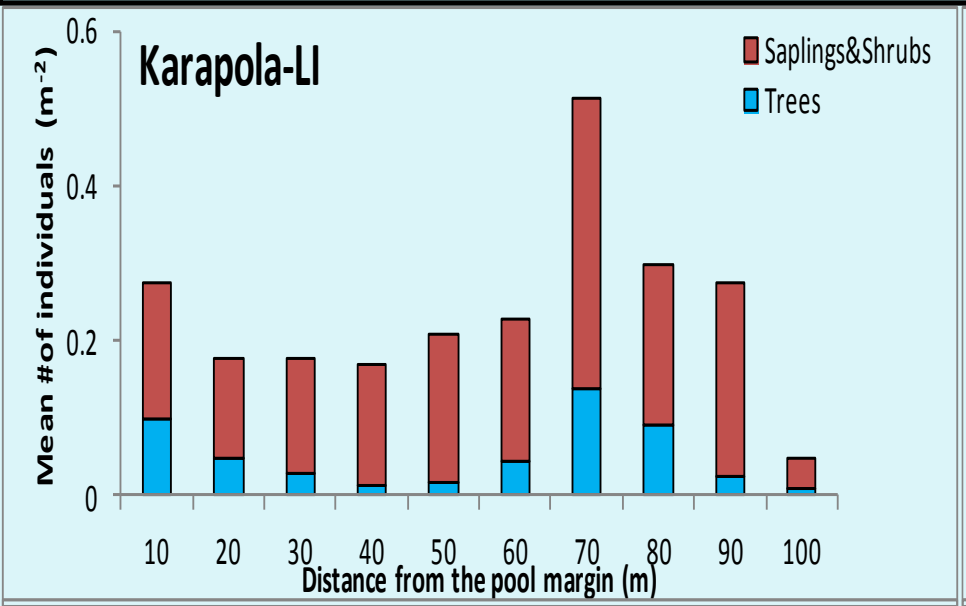
Trees (>5 cm dbh)

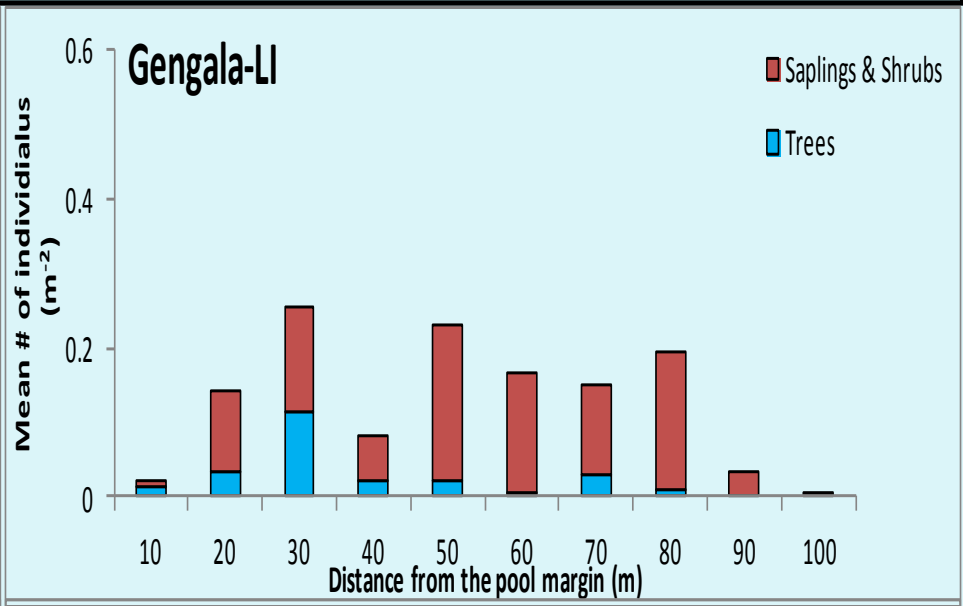
Saplings and shrubs(< 5cm dbh and> 1m height)

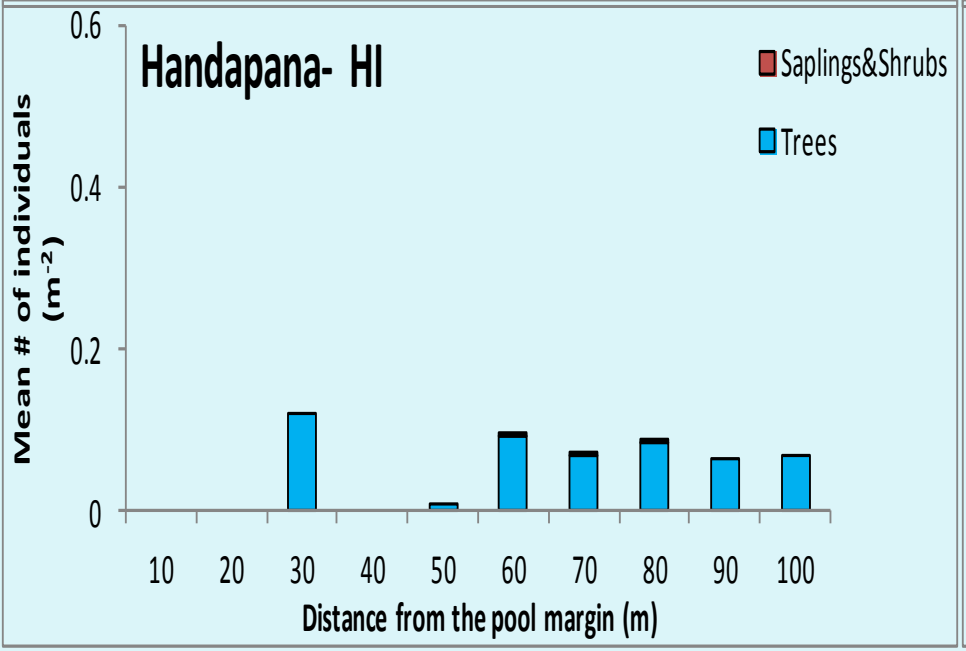
Herbs, Shrubs, Graminoids

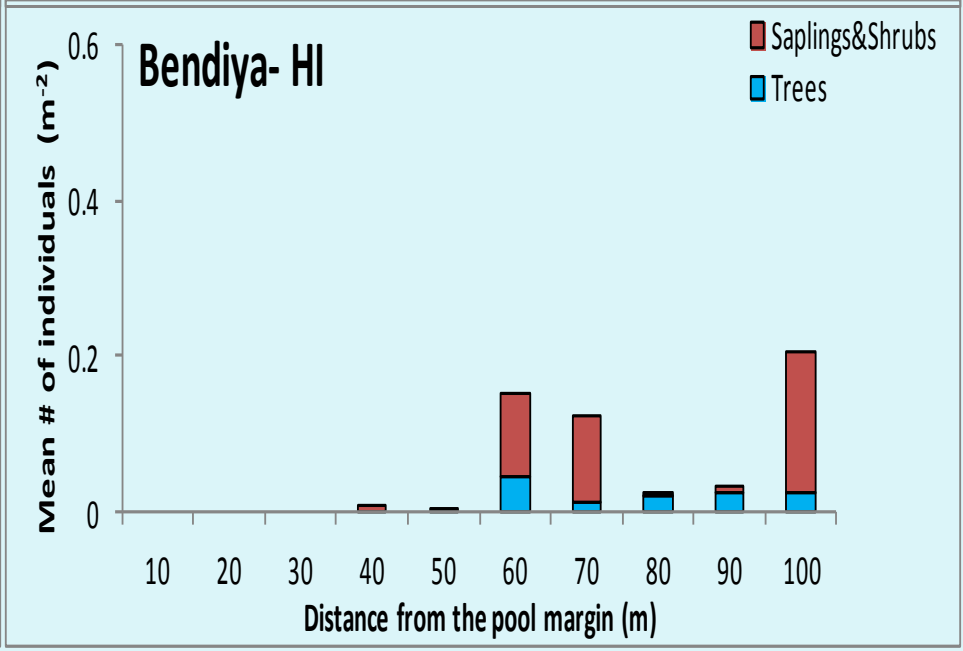
Aquatic plants

Distribution of trees & shrubs

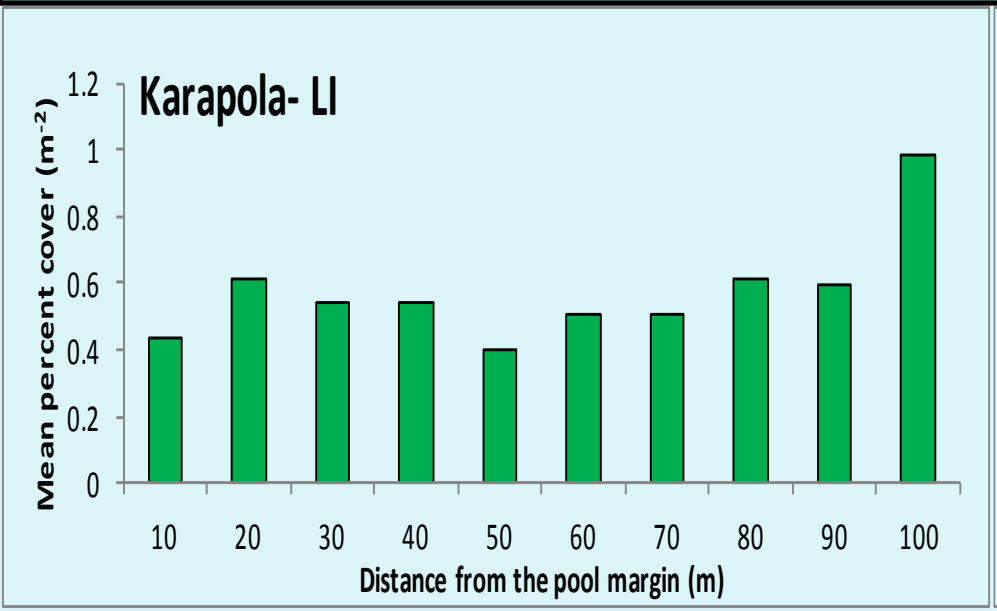


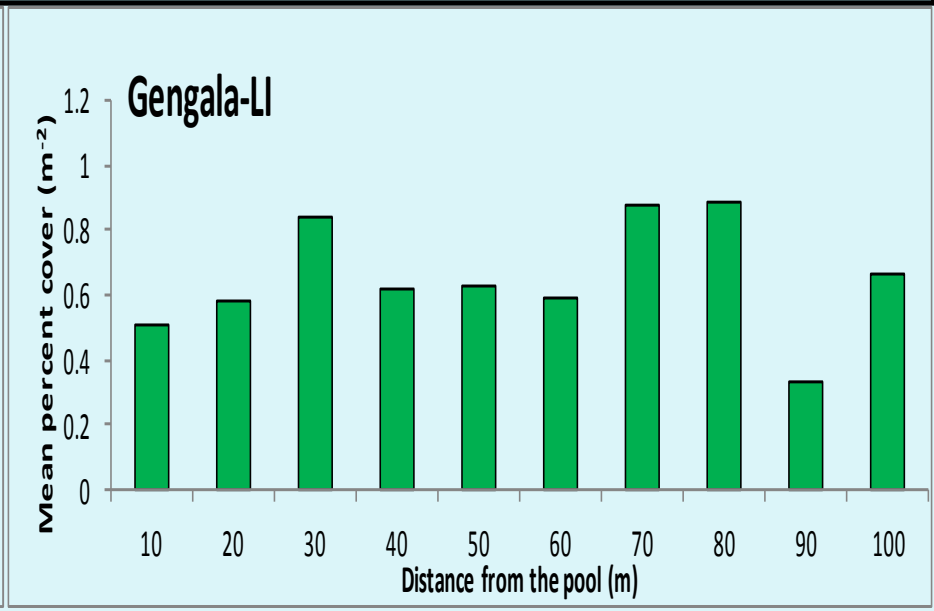


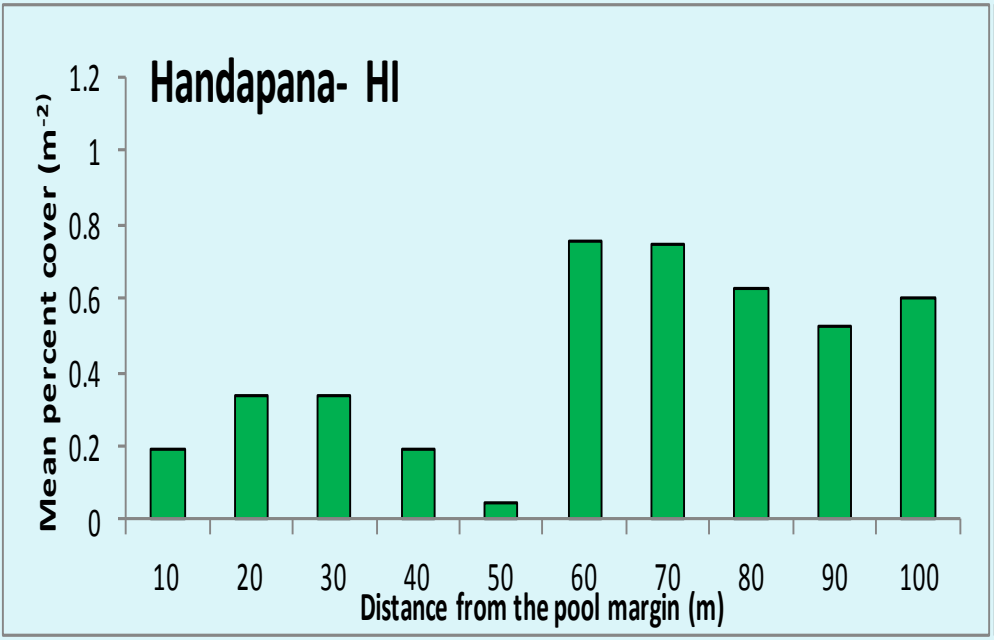


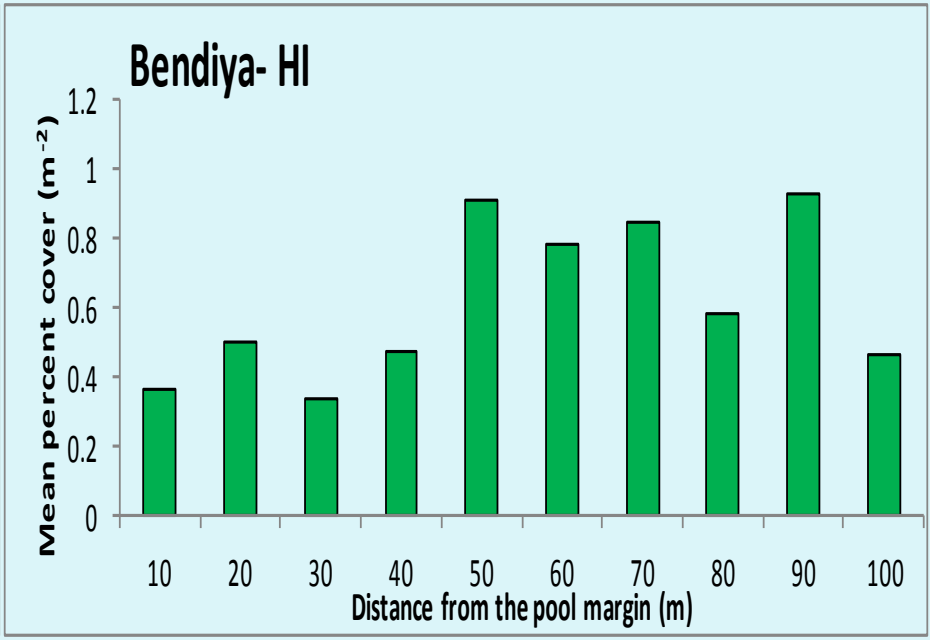


Distribution of Graminoids & Herbs

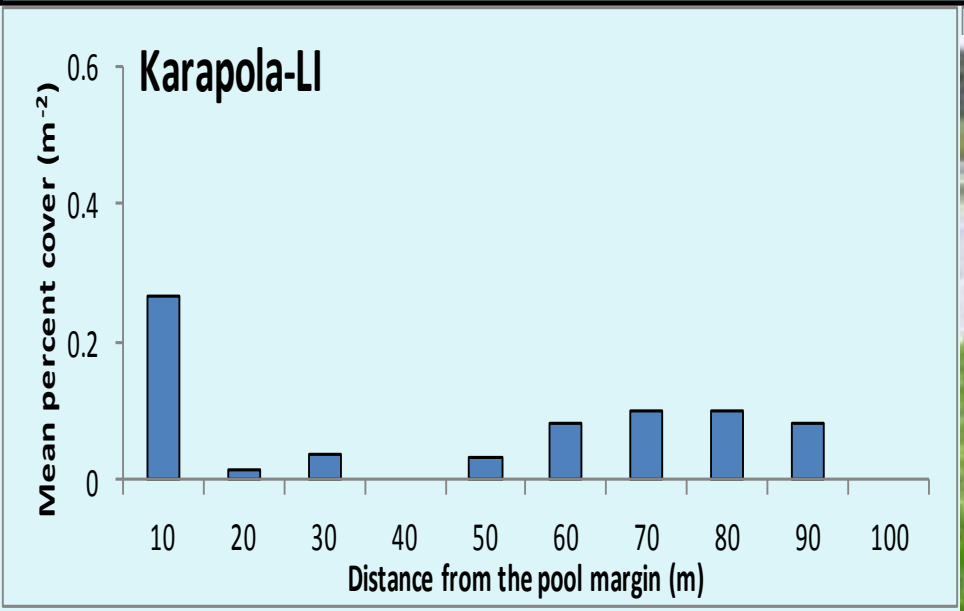


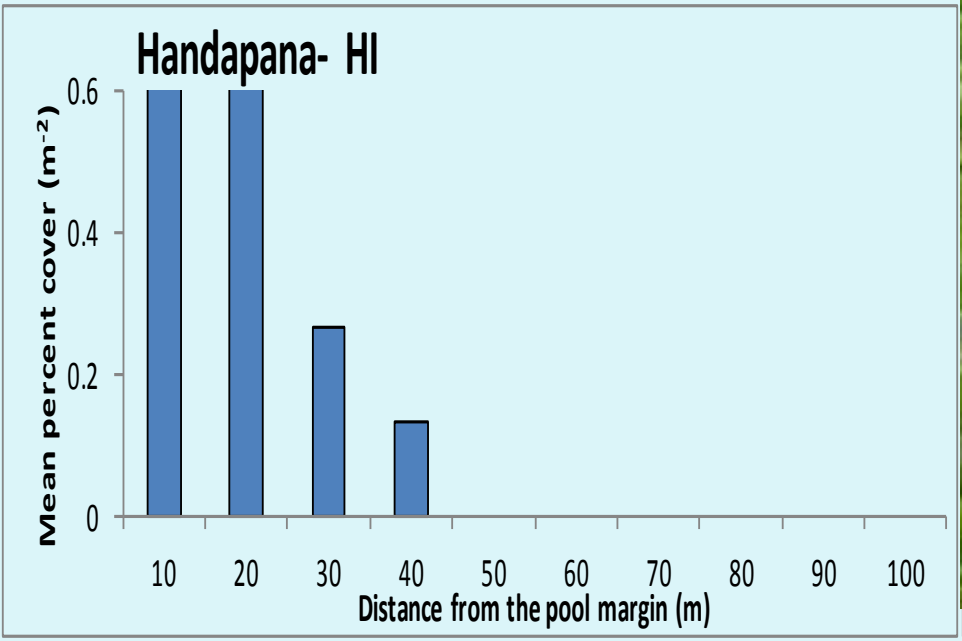






Distribution of Aquatic plants





Dominant species

Barringtonia racemosa
Native

Schoenoplectus grossus
Native

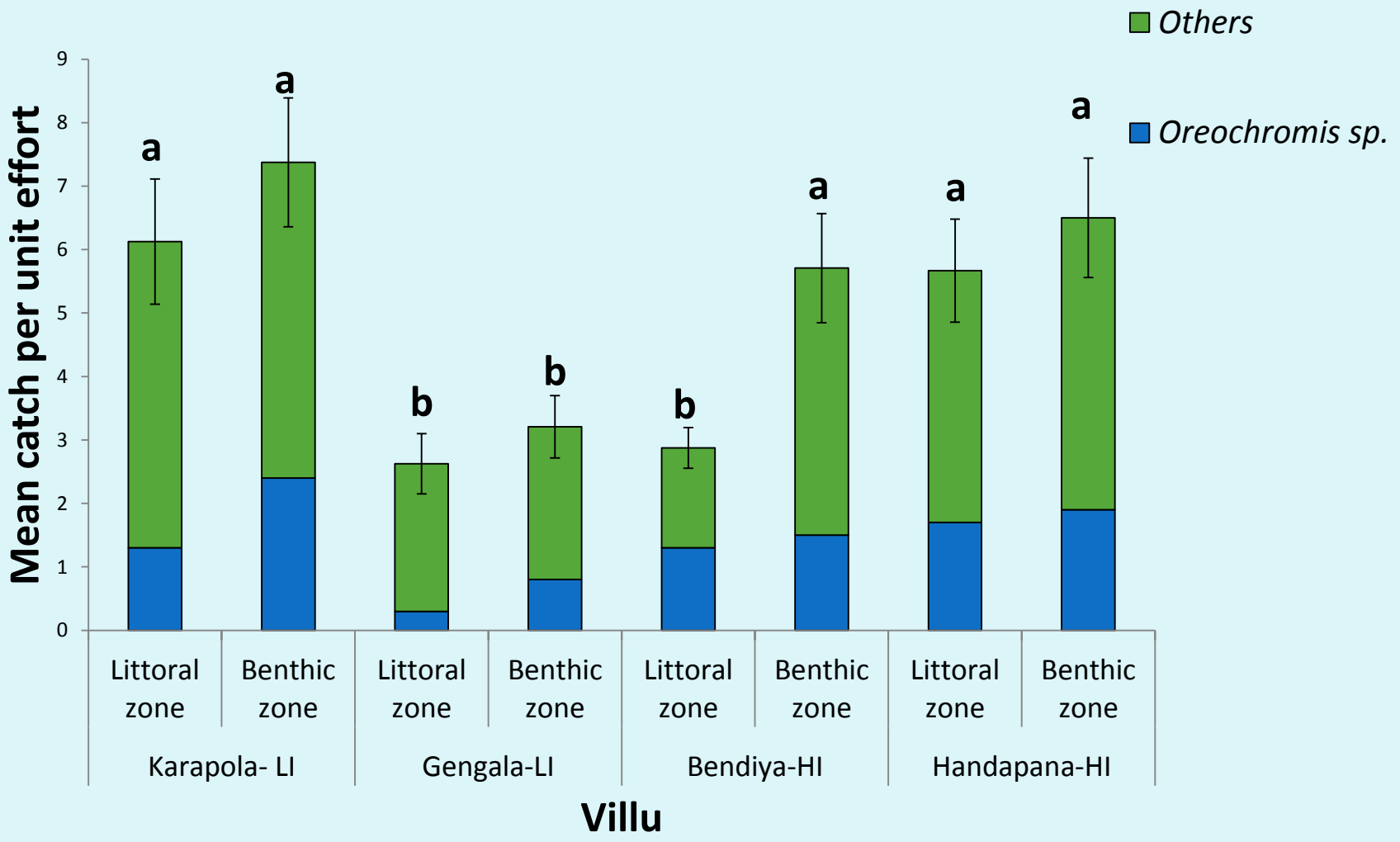
Eichhornia crassipes
Exotic, invasive

Methodology- Fish sampling

Fish sampling was done using cast nets

Fish were counted, photographed and identified

Abundance of Fish in *Villus*



Social Survey

- A survey : personal interviews (100 households-40% percent of the total population)

Regression Results on livelihood activities

- As suggested by the F value, the model is highly significant at α = 0.01 level
- All selected model parameters are significant at α = 0.05 level
- Number of dependents and education level increase have positive impact on income
- The increase use of firewood and lands have negative impacts on household total income

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.534[a]	.286	.250	.62823

a. Predictors: (Constant), LandAcres, Firewood, Education, Nofdependents

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.623	4	3.156	7.996	.000[b]
	Residual	31.574	80	.395		
	Total	44.197	84			

a. Dependent Variable: lnTMIncome

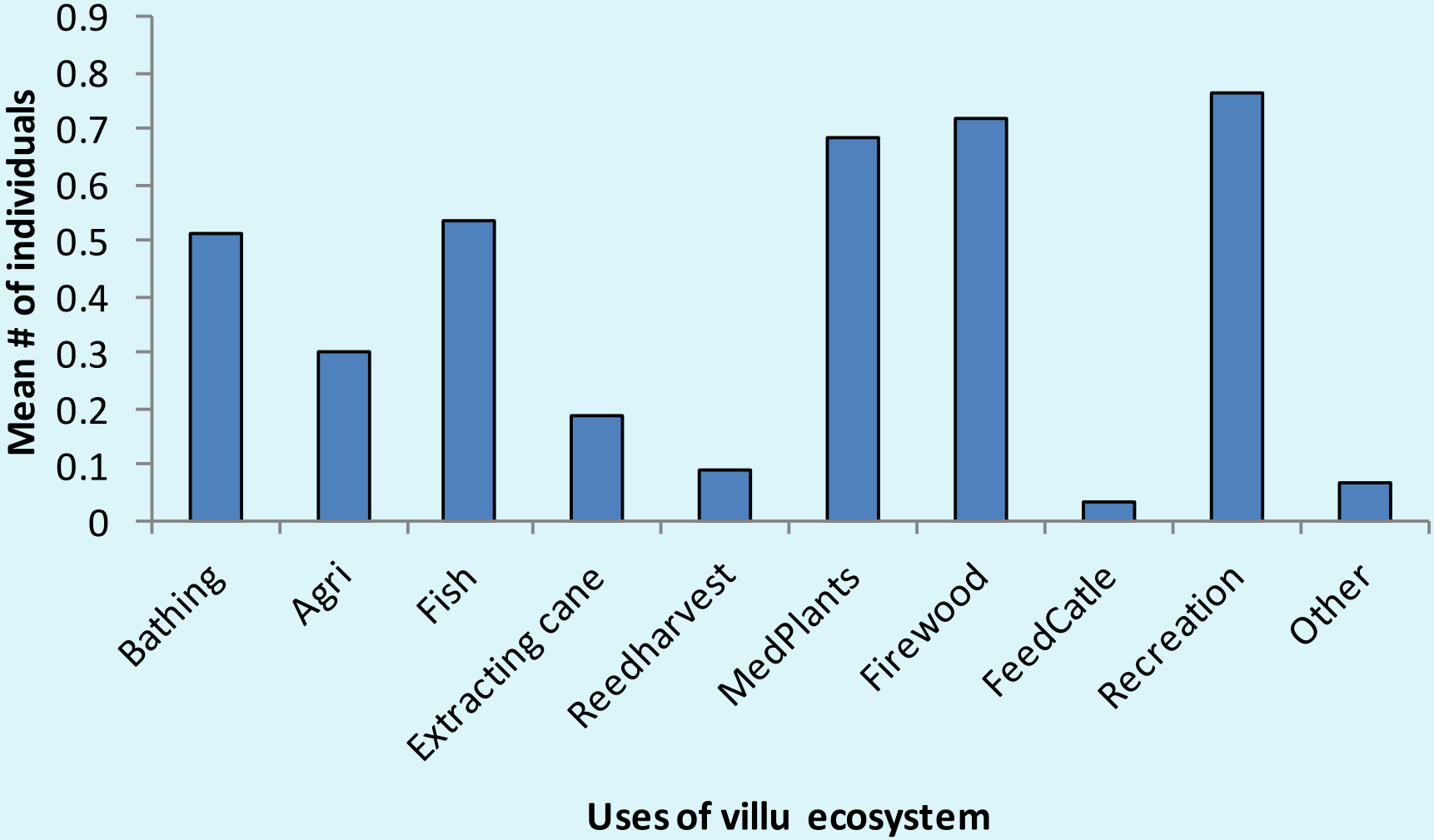
b. Predictors: (Constant), LandAcres, Firewood, Education, Nofdependents

Coefficients[a]

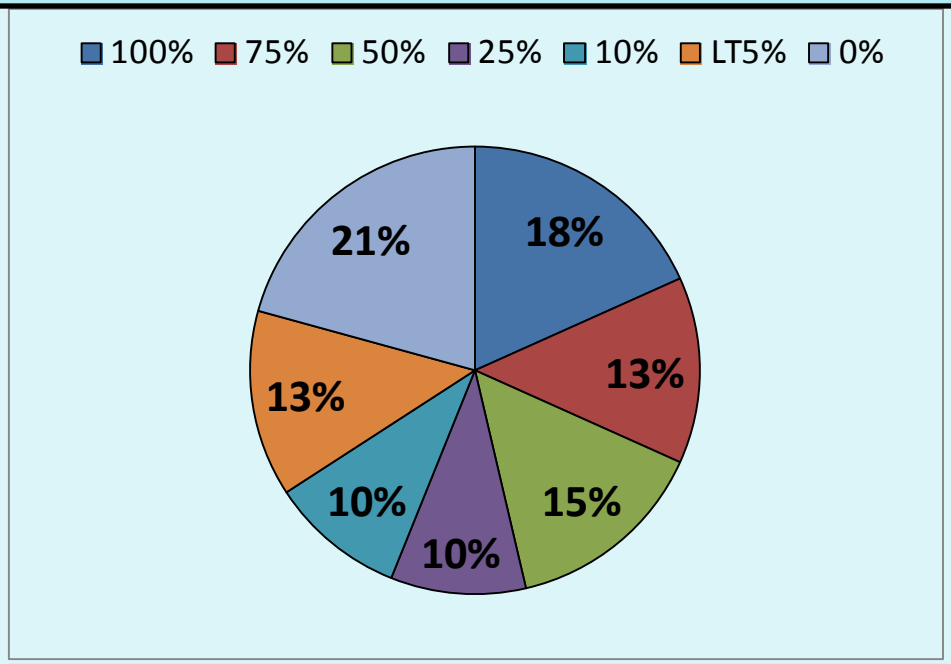
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.327	.241		38.774	.000
	Nofdependents	.106	.046	.225	2.326	.023
	Education	.069	.018	.370	3.837	.000
	Firewood	-.345	.152	-.215	-2.272	.026
	LandAcres	-.570	.257	-.212	-2.215	.030

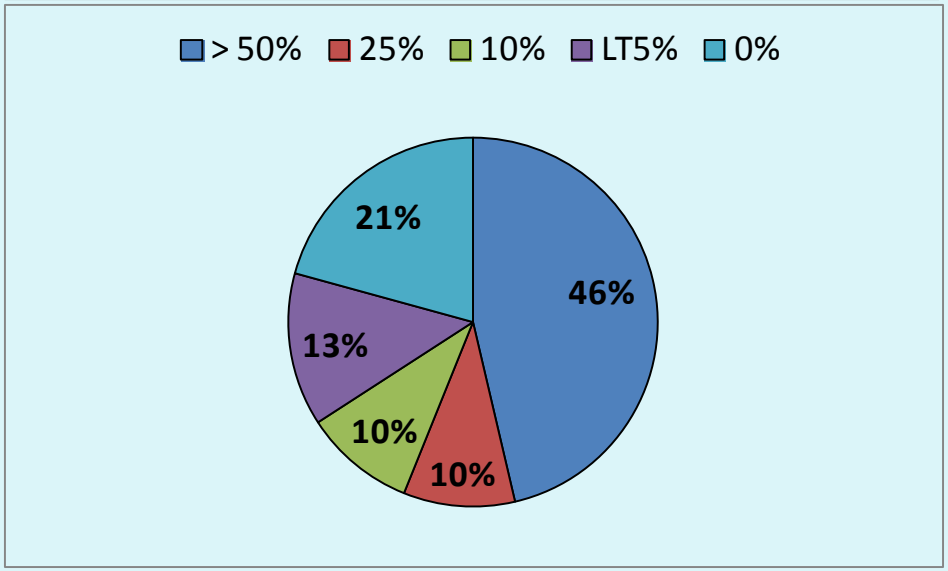
a. Dependent Variable: lnTMIncome

Human interactions with *Villus*



Proportional income of villagers from *villus*





Conservation attitudes of people

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a) Our future will be benefitted from ES services of villus	**1**	**2**	**3**	**4**	**5**

Conservation of biodiversity in Villus

Villagers' perception about *villus*	Score	Result
We depend on the ecosystem (ES) services that villus provide	3.79	Agree
Our future will be benefitted from ES services of villus	4.58	Strongly agree
We should conserve villus for the benefit and existence of flora and fauna	4.25	Agree
I have little or no interest in the villus environment	2.59	Disagree
I think that the local community has a responsibility for the protection of the villus environment	4.22	Agree
Eco-tourism should be developed in Villus for sustainable income	3.63	Agree
Development activities that destroy Villus should be banned	3.14	Neutral
The Government should do more to protect the villus environment	3.97	Agree
Villus should be preserved for the benefit of my children and future generations	4.15	Agree
Reforestation is important to preserve villus environment	4.35	Agree
Conservation of wetlands is important for the sustainability of villus	4.39	Agree

Other threats on *villus*

Fire

over-grazing

over-extraction of cane

Fishing

Paddy cultivation

Preliminary Inferences

- River regulation has an impact on the *villu* vegetation in the Mahaweli downstream
- Other anthropogenic activities also cause negative impacts on *Villus*
- Most villagers depend on *villus* for their daily needs and income
- Villagers also showed a positive attitude towards conservation of *villus*

Acknowledgements

- World bank HETC Window 3 for funding the research project
- Advisors
- Field assistants

Thank You
SCCS Australia!