

Assessment of Current and Future Hydrological Conditions Using the GenRiver Model: evaluating the existing PES scheme in Cidanau watershed

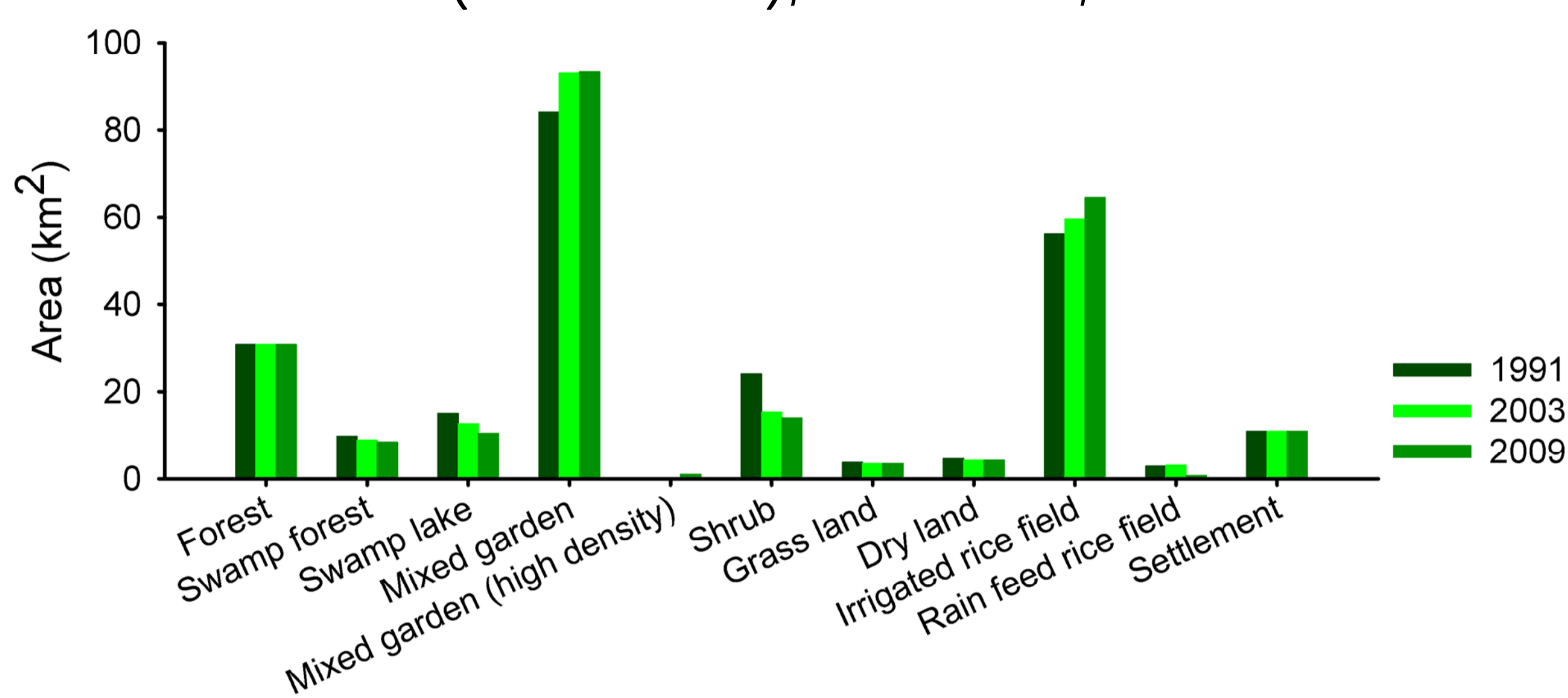
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Background

- Ecological functions of watersheds, including hydrological functions, are directly linked to human well-being; they respond to changes in land cover, climate and engineering of the river flow and its buffering in wetlands,
- The Cidanau watershed in western Java (Banten province) provides water to downstream communities as well as companies. An industrial water supply company experimented with a payment scheme for watershed services, jointly with a multi-stakeholder forum and local governments.
- Initial focus of payment scheme was on increasing the tree density of existing agricultural systems in an area of 100 ha.
- We applied a hydrological model, GenRiver, to analyze the effectiveness of the existing scheme and some of its alternatives

Study site

Cidanau watershed (241.64 km²), West Java, Indonesia

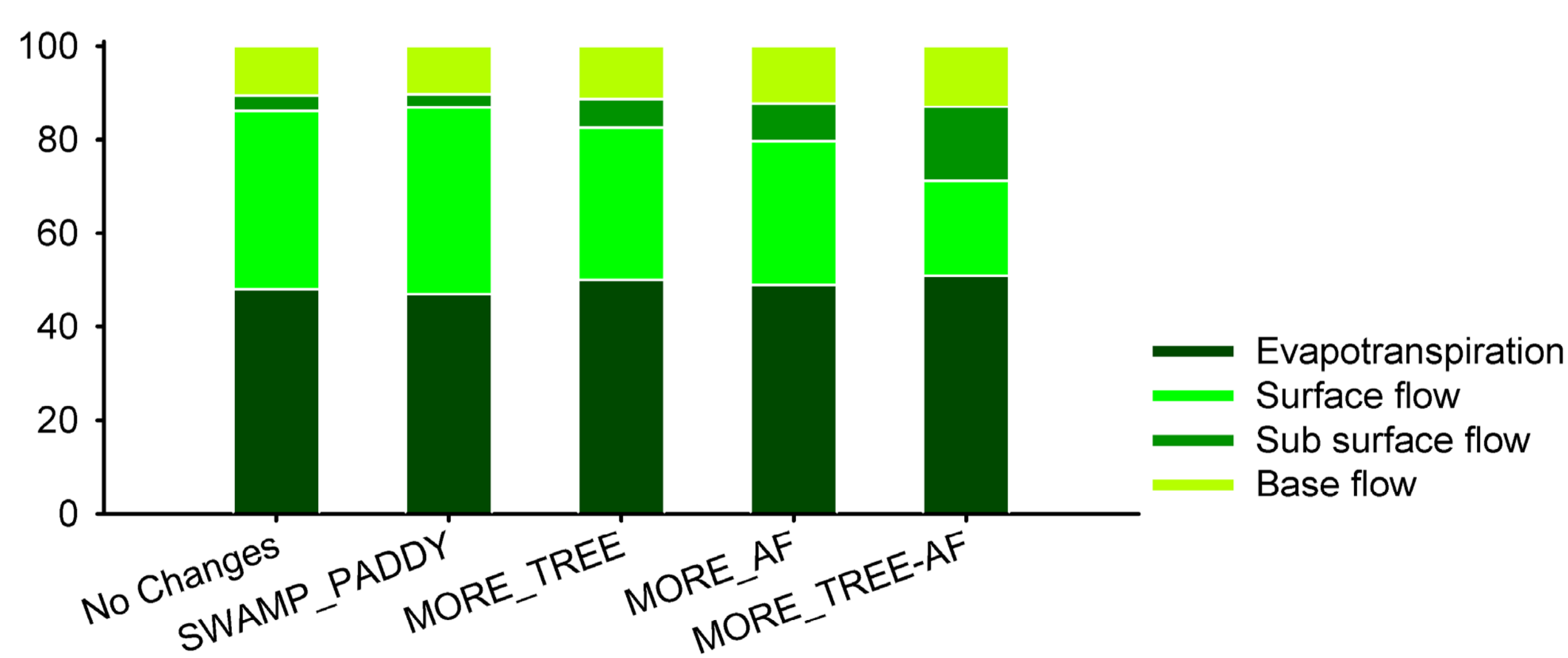


Modeling Steps

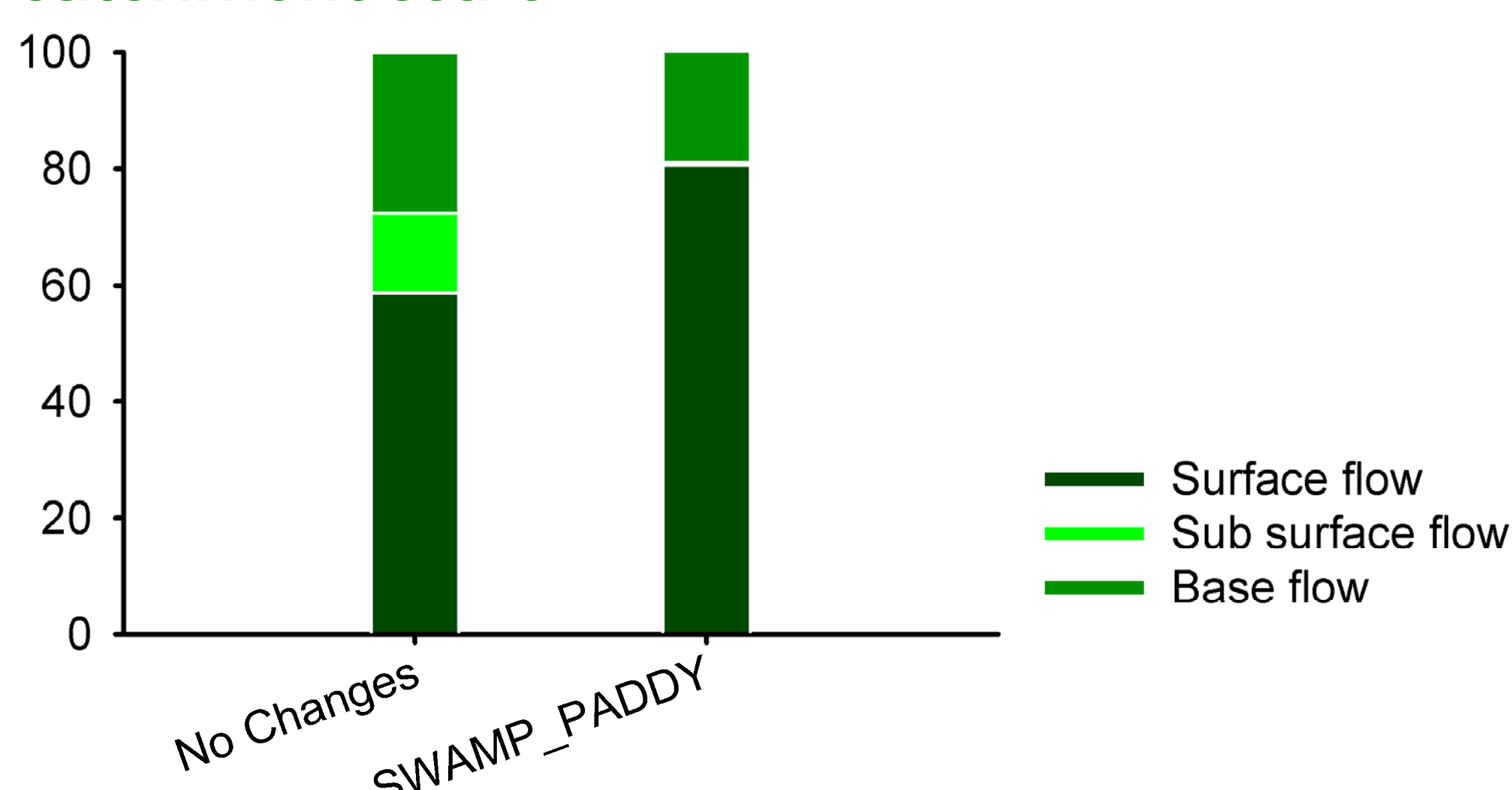
- Consistency test of rainfall and discharge data,
- Analysis of watershed characteristic (land cover, soil, boundary and river network),
- Calibration by comparing measured and simulated discharge based on six years data,
- Evaluating current condition at catchment and sub catchment level (SC 13_more tree and SC15_less tree),
- Evaluating future condition (10 year) based on land cover change scenarios at catchment scale:
 - swamp forest → irrigated paddy field (SWAMP_PADDY),
 - increasing tree density of existing tree-based systems (MORE_TREE),
 - shrub, grassland, irrigated paddy field and clear land → tree-based systems (MORE_AF),
 - combined scenario B and C (MORE_TREE-AF)
- Evaluating future condition (10 year) of conversion of swamp forest into irrigated paddy field at sub catchment scale (SC 4)

Future Condition

Catchment scale

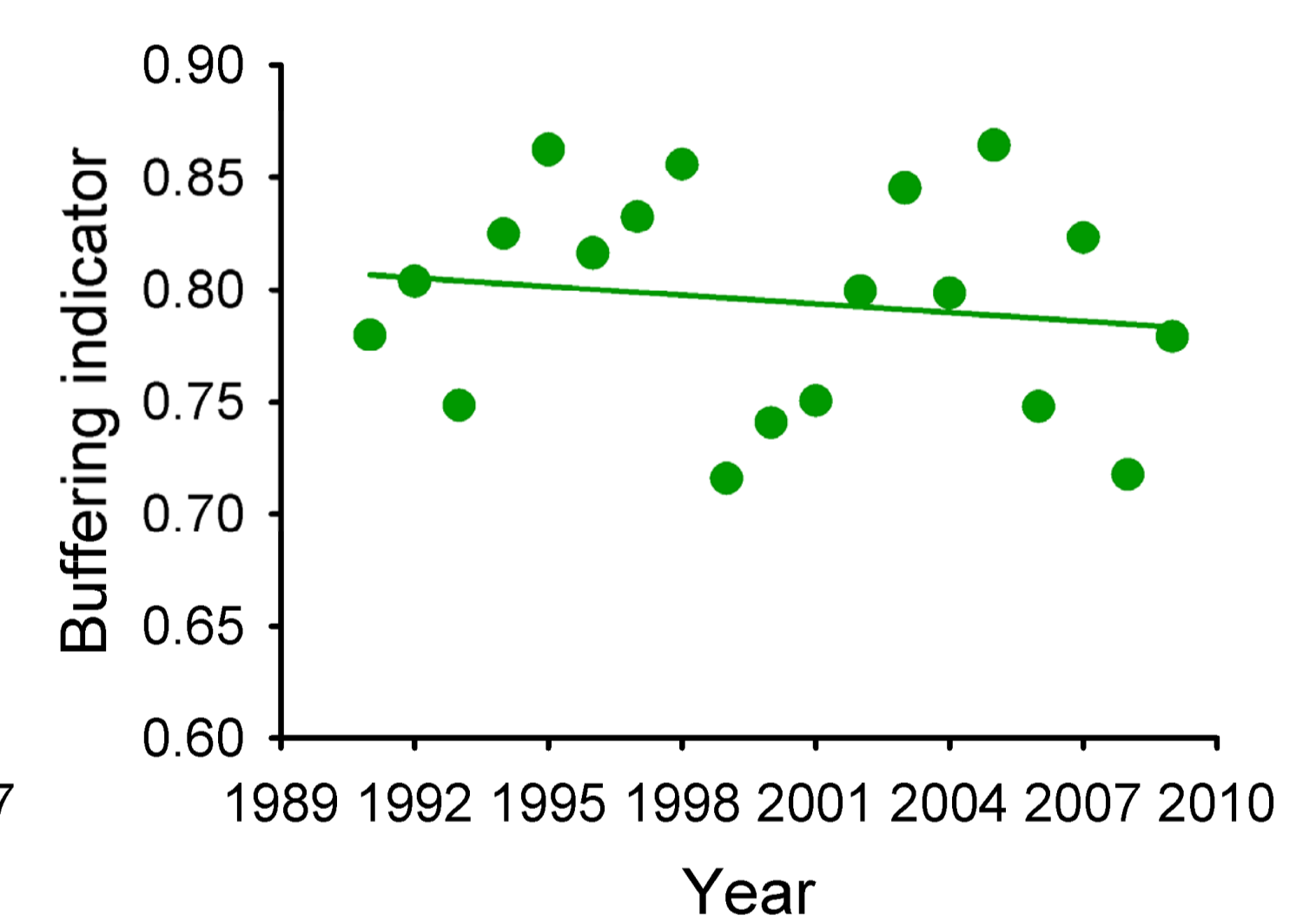
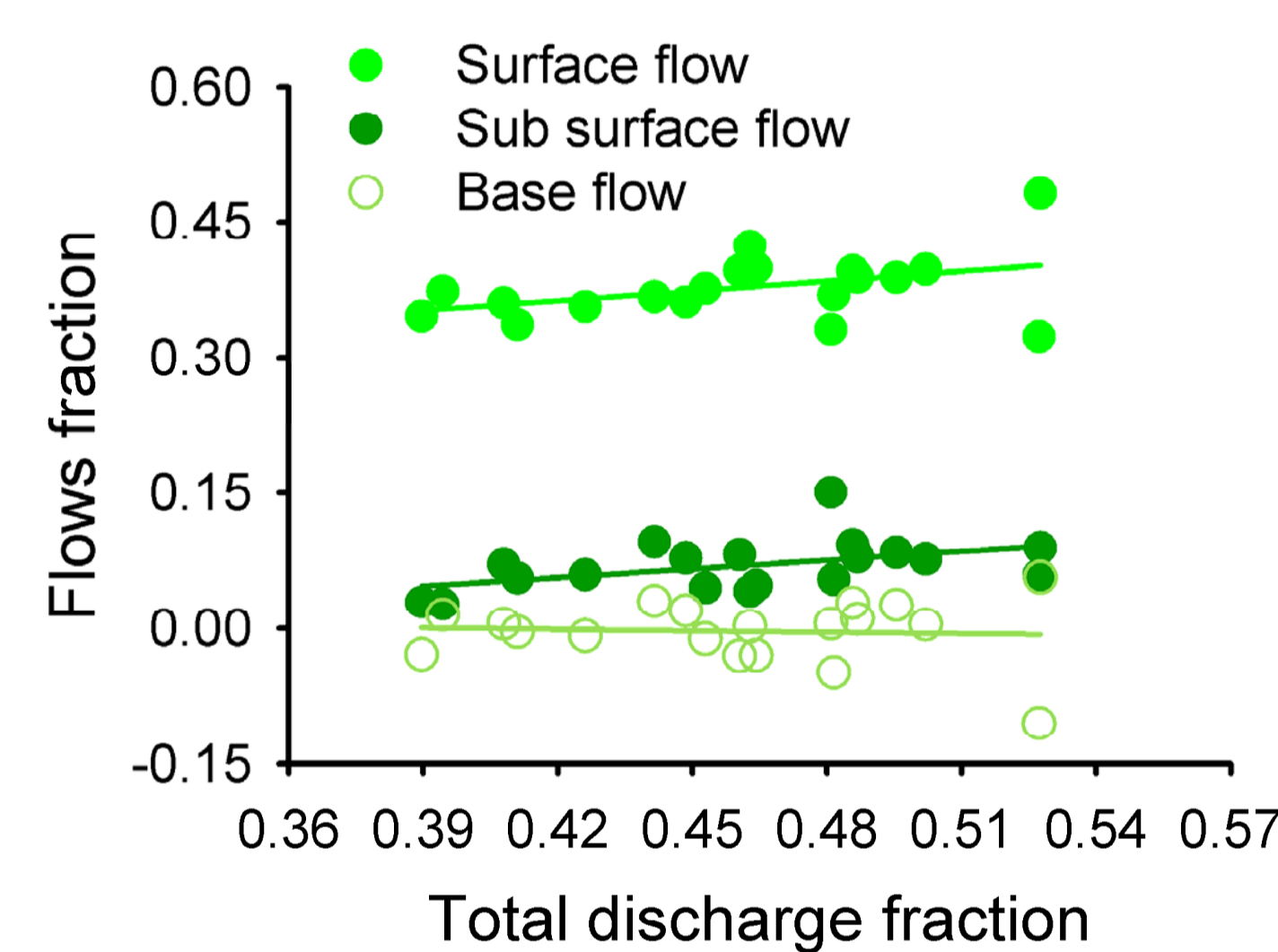


Sub catchment scale

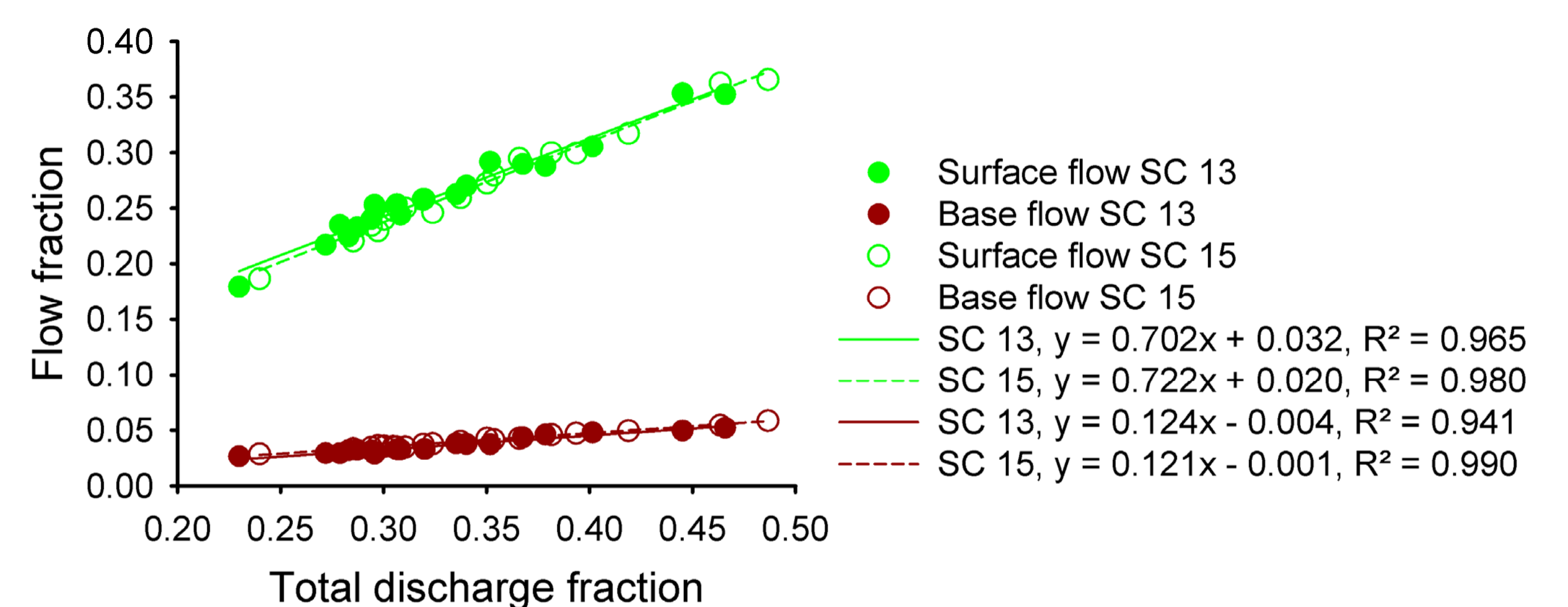


Historical and Current Condition

Catchment scale



Sub catchment scale



Conclusion

- The presence of tree-based systems, forest and peat swamp/lake in the upstream area all contributes to current hydrological function of Cidanau watershed.
- Increasing area and density of tree-based systems in the watershed can enhance the water balance and enhance buffering of river discharge of the watershed, although the current size of area for PES scheme is too small to expect measurable impact given the size of the watershed.
- Further prioritization among sub watersheds is needed.

For more information, please contact:

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