

Sustainable Sloping Land & Watershed Management 2006
Luang Prabang, 12-15 December 2006

Hillslope sediment trapping of natural or cultivated riparian vegetation of Northern Laos

O. Vigiak, O. Ribolzi, C. Valentin, O. Sengtaheuanghoung



www.iwmi.org

Changes of land use in sloping land



- In Northern Laos, recent intensification of the land use led to increased sediment delivery to water bodies



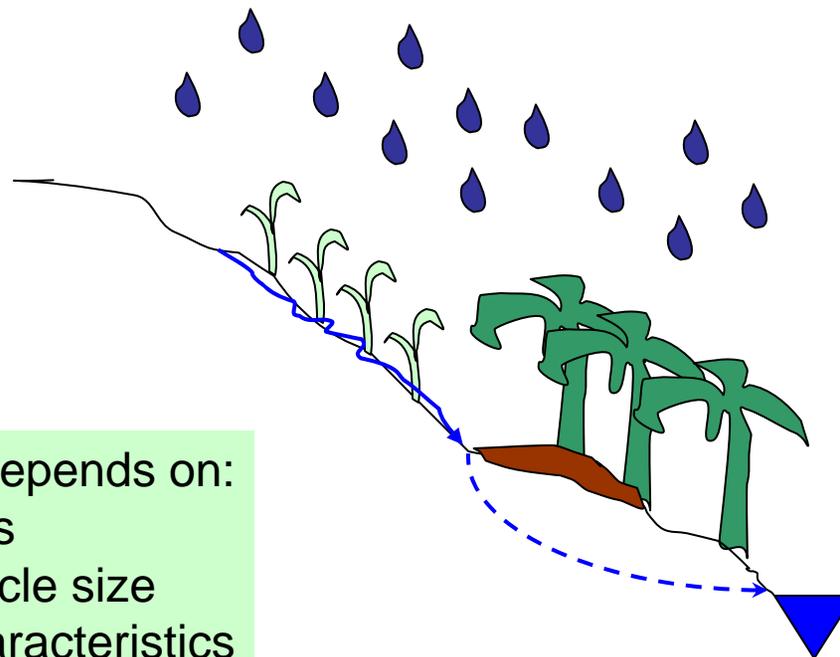
Changes of land use in riparian land



Research questions

- what are the impacts of these changes on ecological functions of riparian land?
- what management of riparian areas can counteract the off-site impacts of increased erosion on the hillslopes?

Sediment retention in riparian land



effectiveness depends on:
-inflow amounts
-sediment particle size
-vegetation characteristics
-topographic setting

Aims of this study

- to assess water and sediment trapping efficiencies of riparian vegetation types of Northern Laos
- to assess the potential effect of cultivation of riparian land on these efficiencies

Study area: Houay Pano catchment



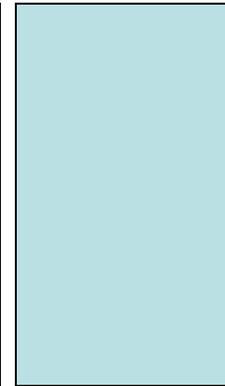
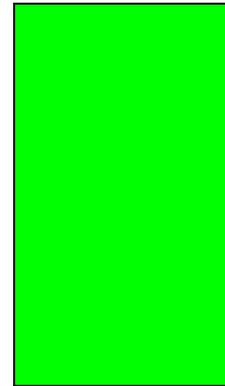
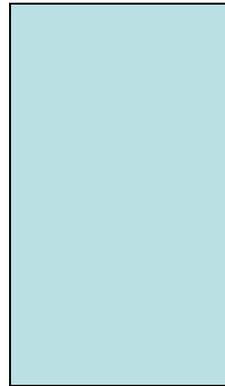
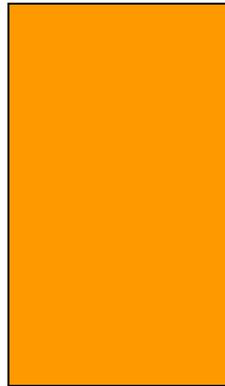
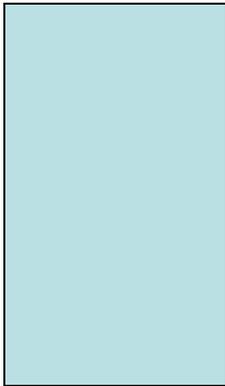
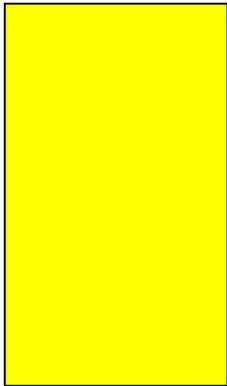
Improving water and land resources management for food, livelihoods and nature

Monitoring of event runoff and sediment

- By using Gerlach troughs, i.e. 50-cm open troughs that intercept water runoff



Experiment set-up: 3 sites in 2 plots



Banana

Bamboo

Natural grass [iwmi.org](http://www.iwmi.org)

Experiment set-up (II): plot setting

- 3 Gerlachs in upper rim to intercept incoming runoff and
- 3 Gerlachs in lower rim to intercept outgoing runoff



Trapping efficiency

$$TE = \frac{X_{UP} - X_{DOWN}}{X_{UP}}$$

- X = water or sediment amount
- UP = average of three upper rim troughs (incoming flow)
- DOWN = average of three lower rim troughs (outgoing flow)
- Defined for water runoff, sediment load, and sediment concentration

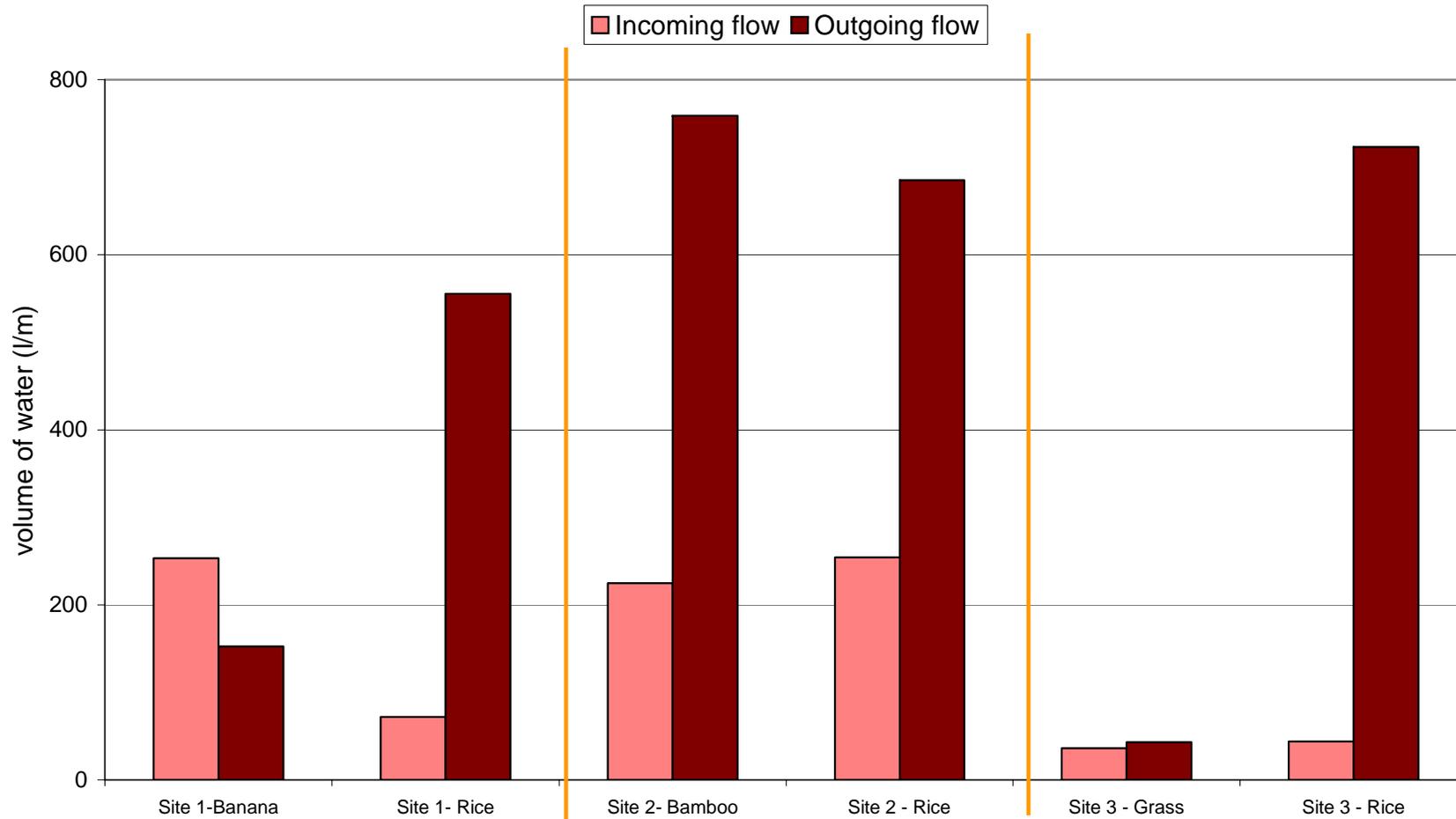
Results of 2006 season



www.iwmi.org

Improving water and land resources management for food, livelihoods and nature

Runoff flows

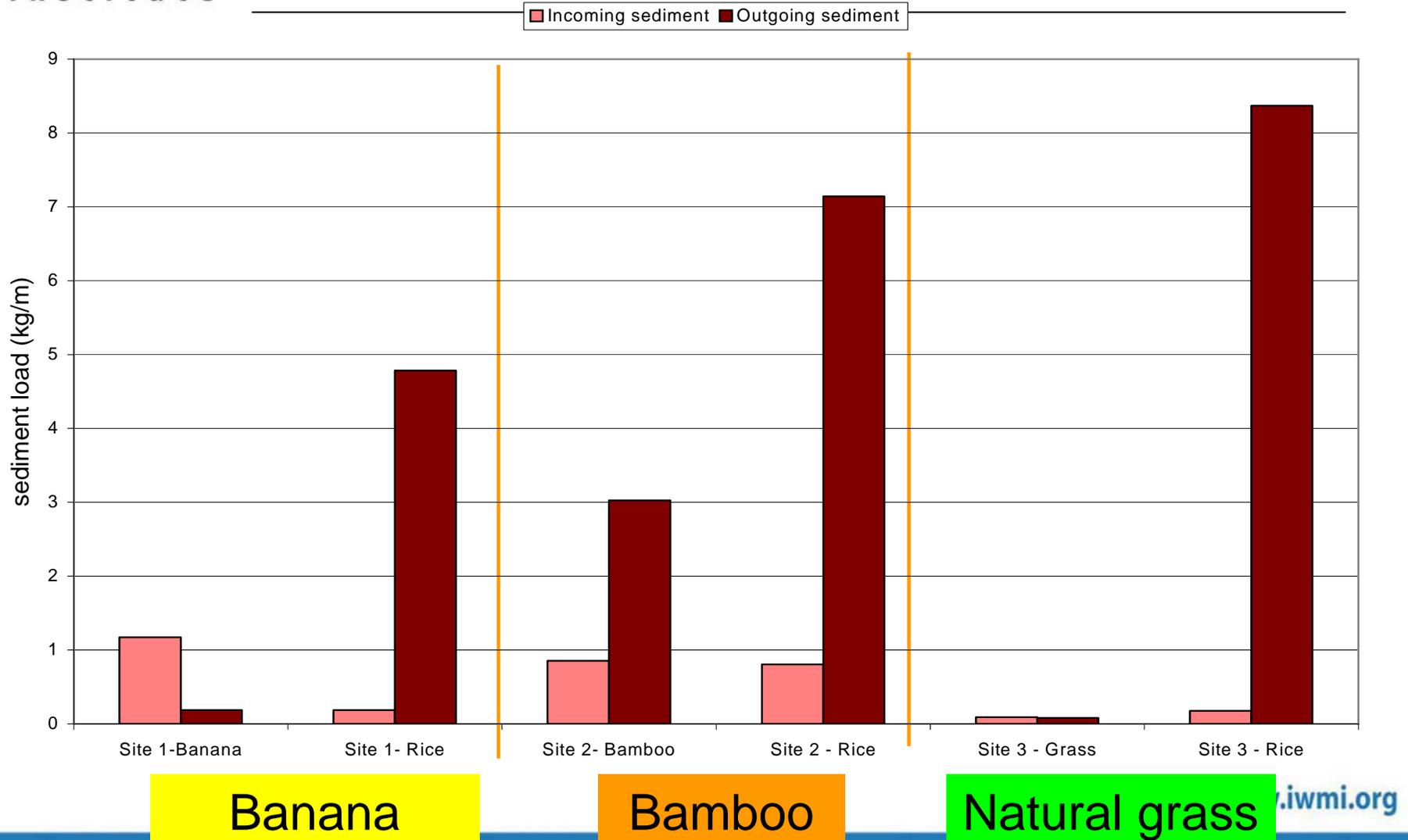


Banana

Bamboo

Natural grass

Sediment load flows



Median runoff and sediment TEs

Site		Runoff	Sediment load
1	Banana	0.4	0.7
	Rice	-8.8	-25
2	Bamboo	-3	-4.5
	Rice	-1.7	-7.2
3	Natural grass	-0.3	0
	Rice	-22	-204

GOOD

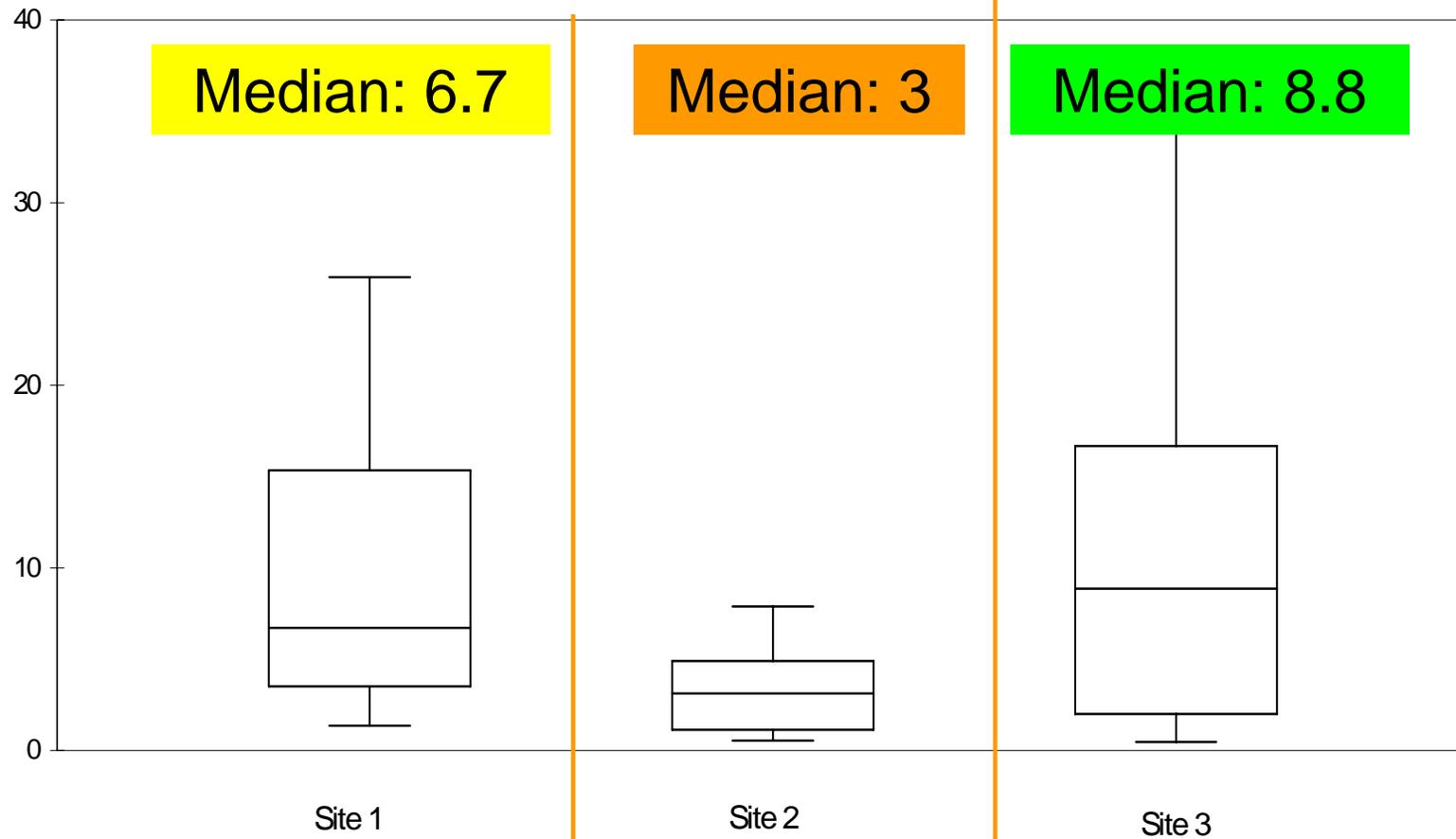
BAD

Median sediment concentration TE

Site		Sediment concentration TE
1	Banana	0.5
	Rice	-2.9
2	Bamboo	-0.5
	Rice	-0.7
3	Natural grass	-0.1
	Rice	-6.6



Out-flow sediment concentration rice / no rice

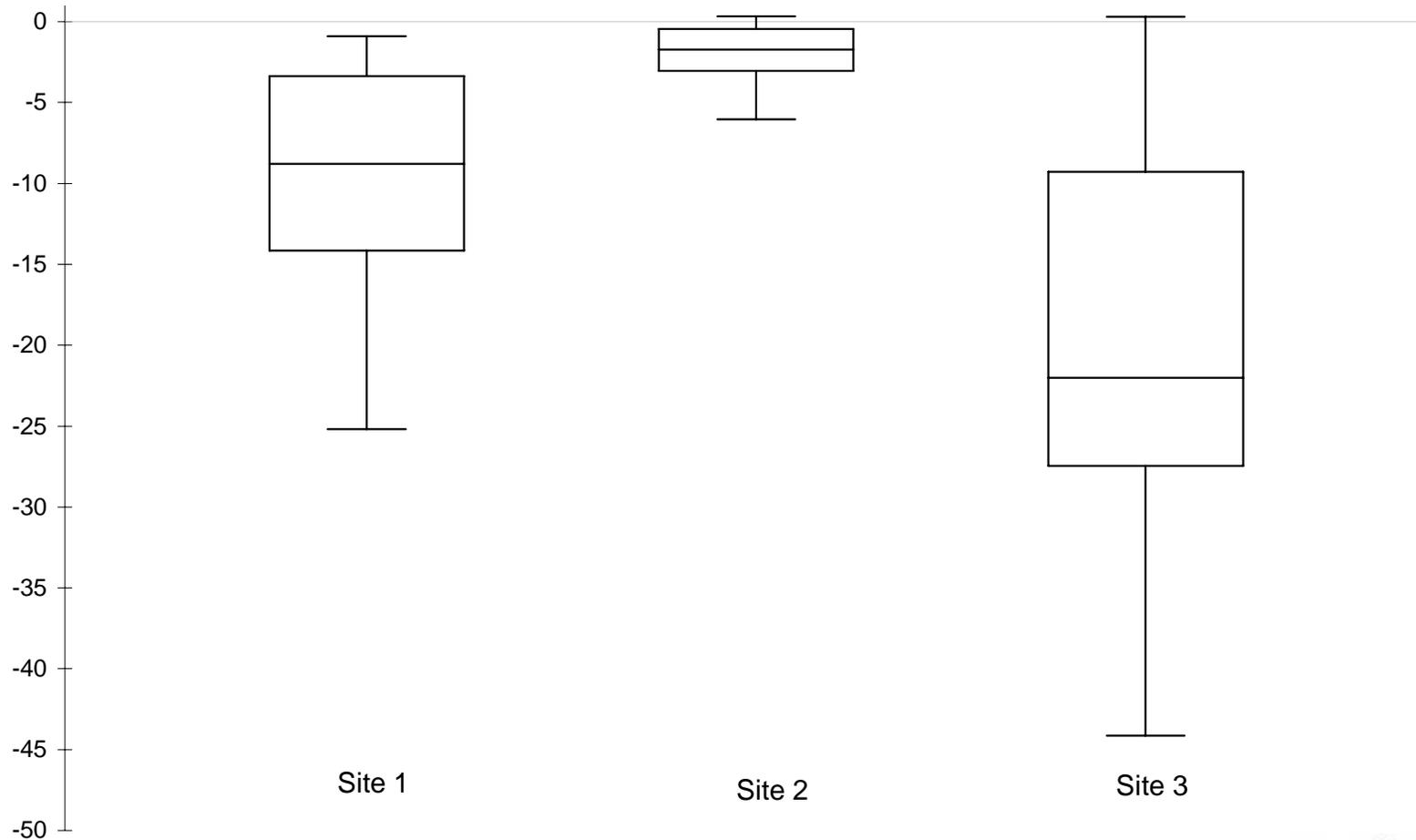


Banana

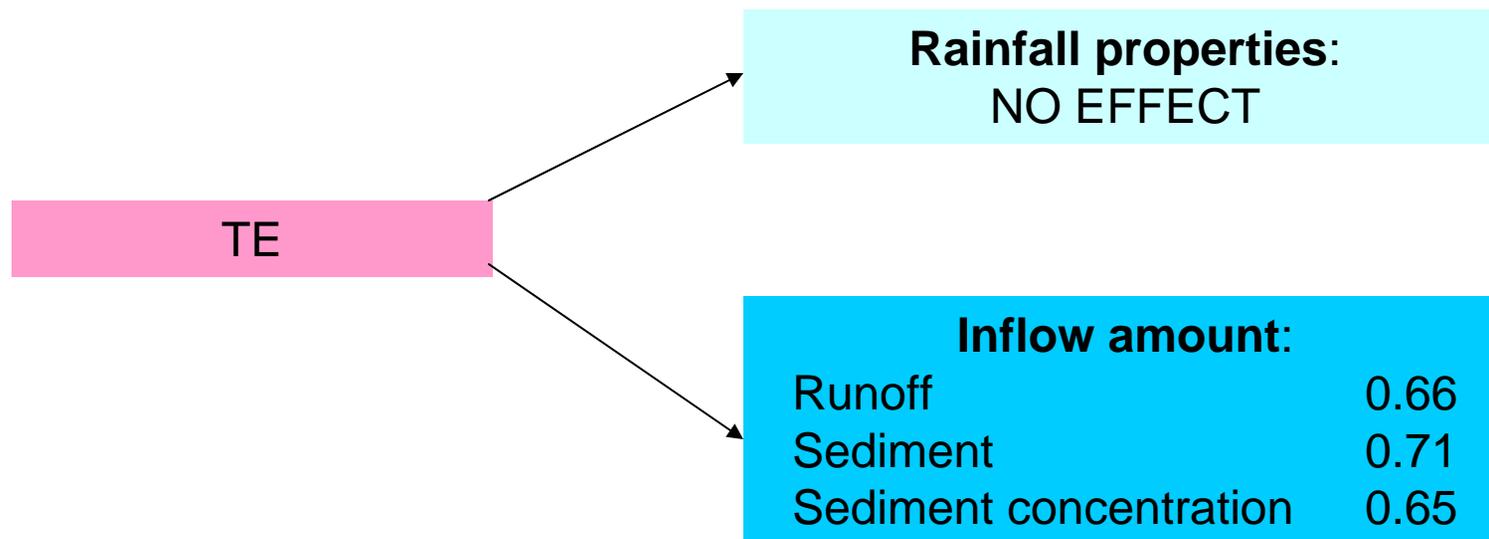
Bamboo

Natural grass

Rice plots runoff (and sediment load) TE



Correlations of trapping efficiencies (rice plots)



Conclusions (I)

- Trapping efficiencies were generally low: clay material and low concentration in inflow?
- In agreement with other (few) studies in tropical countries and in open field conditions

management of riparian land should be complementary but not substitutive of sloping land management



Conclusions (II)

- Banana and natural grass were sinks of water and sediment;
- Bamboo and rice were sources of water of water and sediment;
- Cultivation of riparian land led to a 3- to 9-fold increase of sediment concentration of runoff directly delivered to the streams

cultivation of riparian land with annual crops
largely deteriorate water quality



Thank you for your attention



o.vigiak@cgiar.org

Improving water and land resources management for food, livelihoods and nature