

Developing environmental flow recommendations for a river with limited data: Rio Patuca, Honduras



TOPICS

1. Goals

2. Area description

3. Problem definition

4. Activities

1. Hydrological analysis

2. Field trips

3. Environmental flows workshops

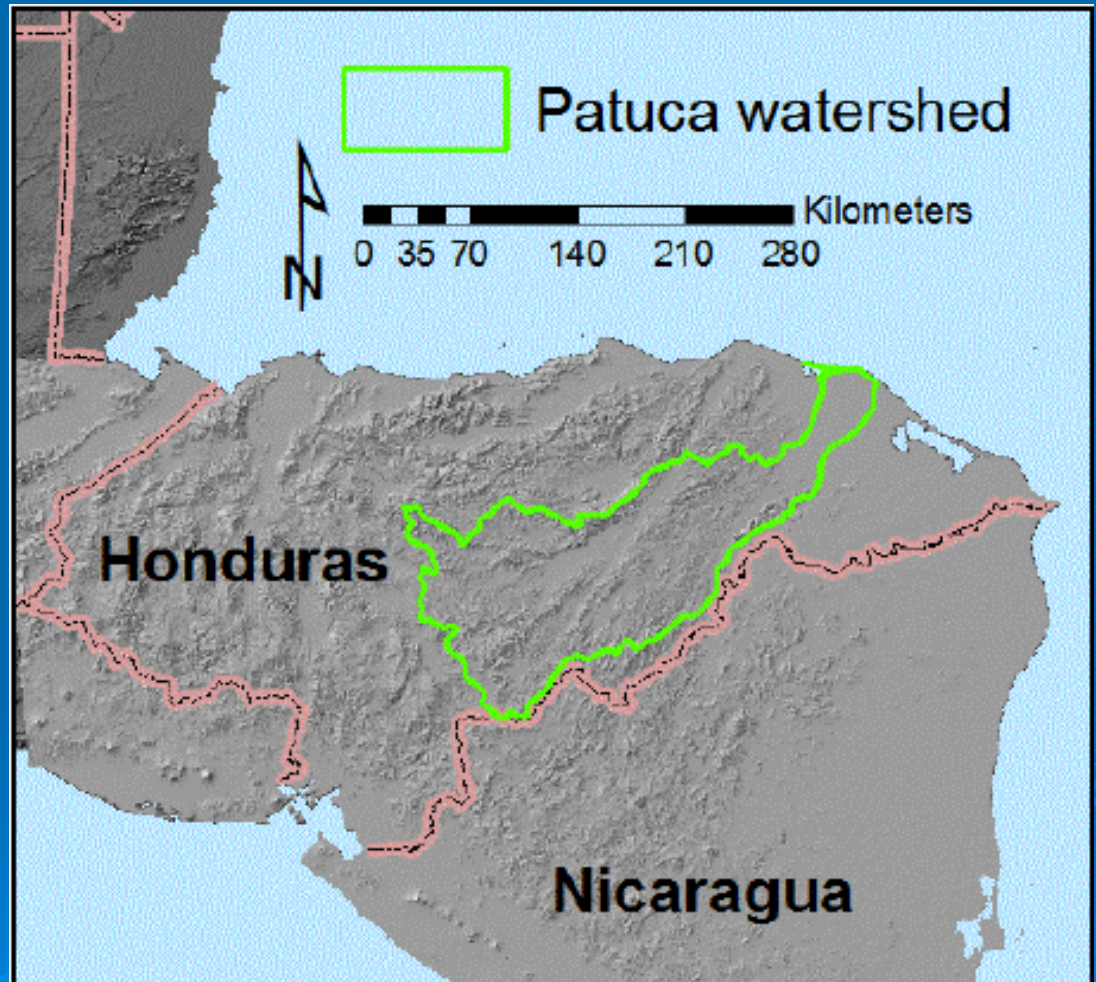
5. Next steps

6. Lessons learned



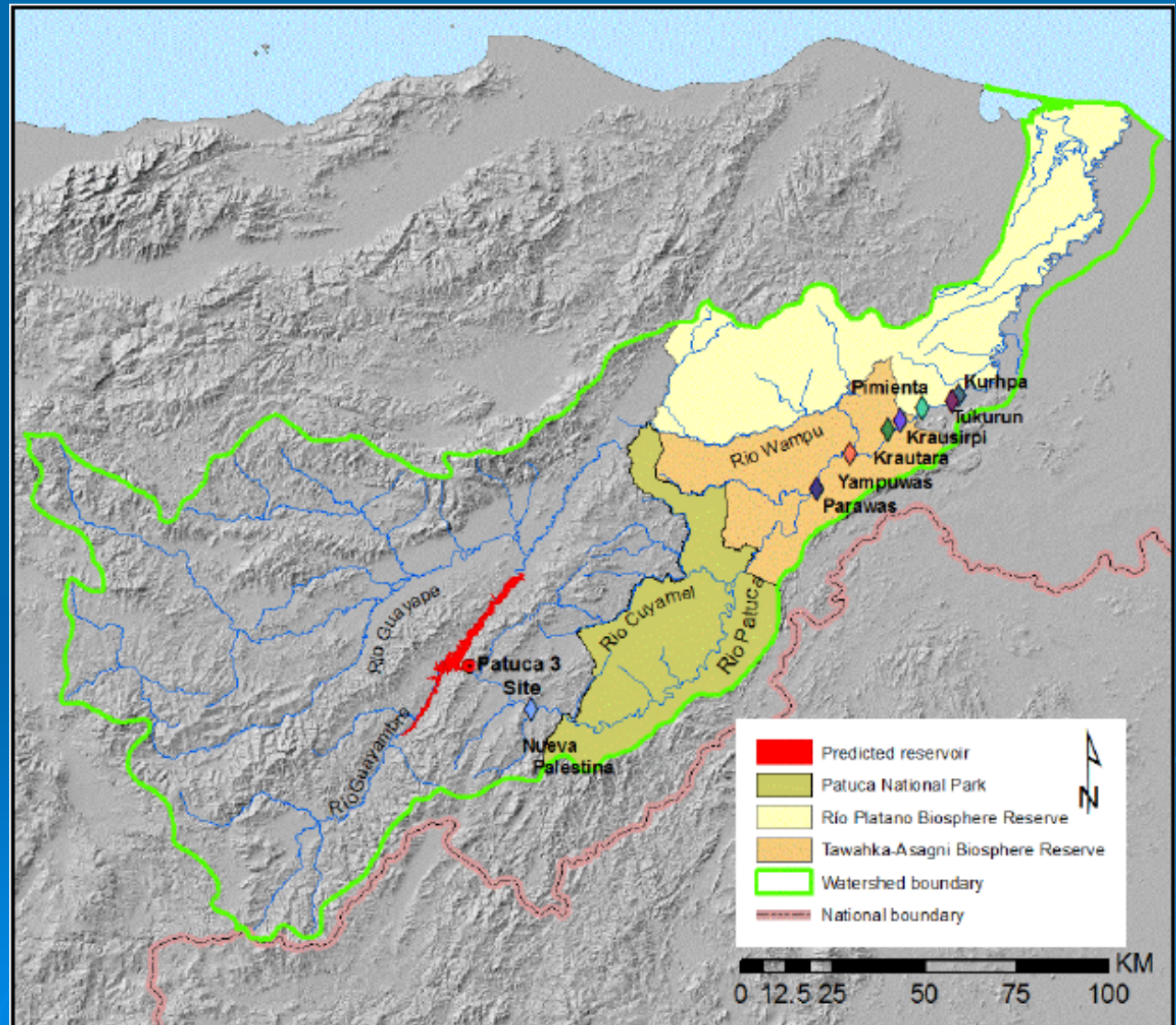
Patuca Watershed

- Longest River in Honduras and undammed
- 2,4 million hectares
- Upstream land use for cattle ranching and forest clearing for pastures
- Lower watershed heavily forested with 3 reserves: Patuca National Park, Tawahka and Rio Platano Biosphere Reserves
- Undocumented fish diversity, possible endemism



Downstream communities

- Below the dam site are numerous Tawahka and Miskito communities
- Roadless area; river is primary transportation route
- River fisheries are substantial source of protein
- Sediment deposition increases fertility of floodplain agricultural fields



Information sources for developing environmental flow recommendations

Typical approach:

- Hydrological data
- Literature reviews
- Workshops with scientists familiar with the river

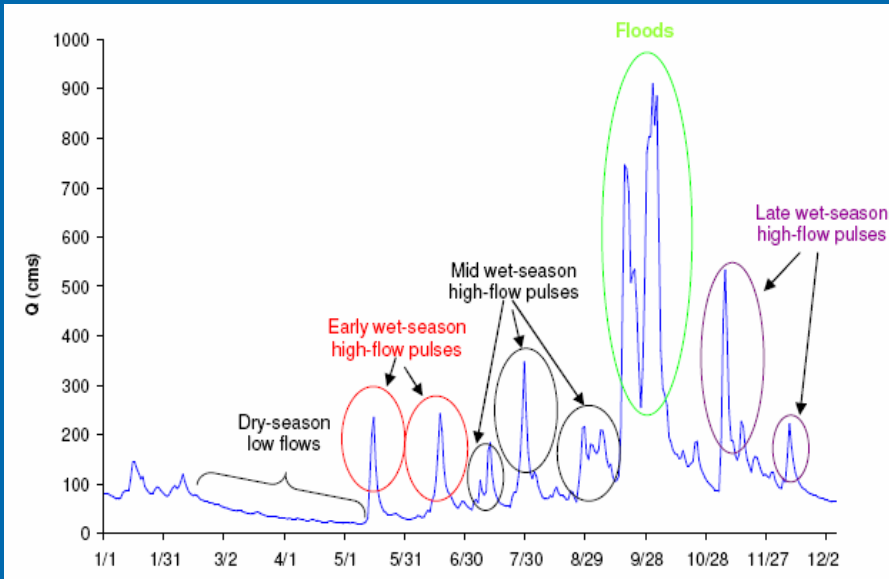
Patuca River:

- Hydrological data
 - 30 years of daily flow
 - Simulated 'with-dam' flows
- No studies or data sets
- Few or no scientists familiar with the Patuca

Communities and Traditional Ecological Knowledge

- Communities have the most at stake
- Communities have knowledge not available elsewhere

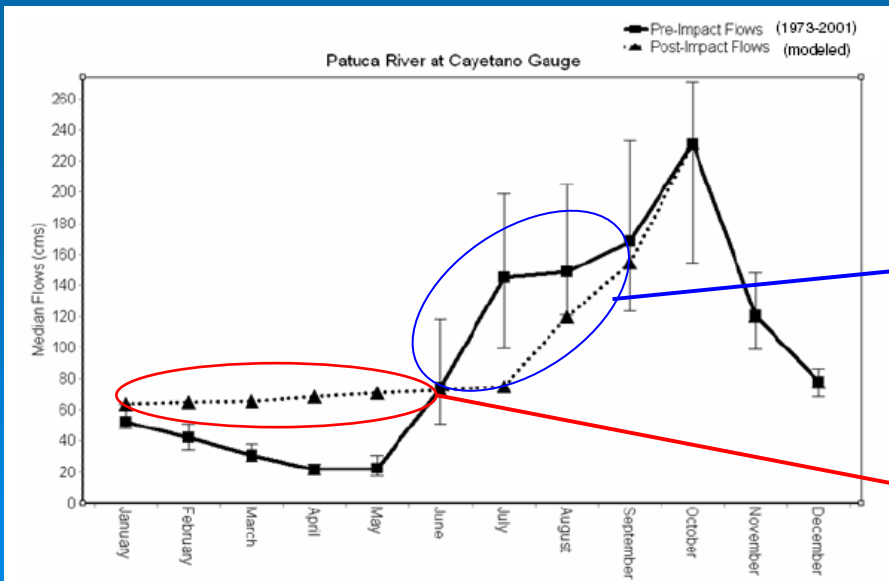
Hydrological analysis



Developed and analysis using IHA software (Index of Hydrological Alteration)

Simulated dam operation in the riverine processes

Floods will remain unchanged with the dam operation



Declined 10% of the high-flow pulses during the wet season

Elevated low flows during dry season (Feb.-May)

Field trips down Patuca River

One in wet season (Sept);
one in dry season (May)

Interviews: socioeconomic and
a survey to collect Traditional
Ecological Knowledge (TEK)



Sample questions:

- What are the most important fish to your community?
- For each fish species:
 - a. How do you catch them?
 - b. Where do you catch them (looking for riverine habitat descriptions, like channel margins, side channels, etc.)
 - c. At what time of year do you catch them?



Field trips down Patuca River

- Drawing maps of communities, river features, and resources (agriculture, fish, etc.)
- Community members help annotate cross-sectional surveys (e.g., location of highest flow from past wet season; height of Hurricane Mitch)



Field trips down Patuca River

- Developing species lists and describing fish ecology through sampling and interviews with fishermen



First workshop

- Scientists, water managers and government agency staff
- Developed initial set of environmental flows based on field tour data, conceptual models, and hydrological analysis

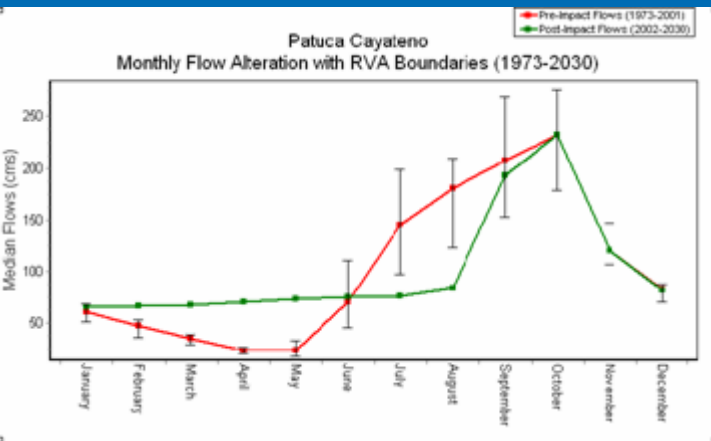
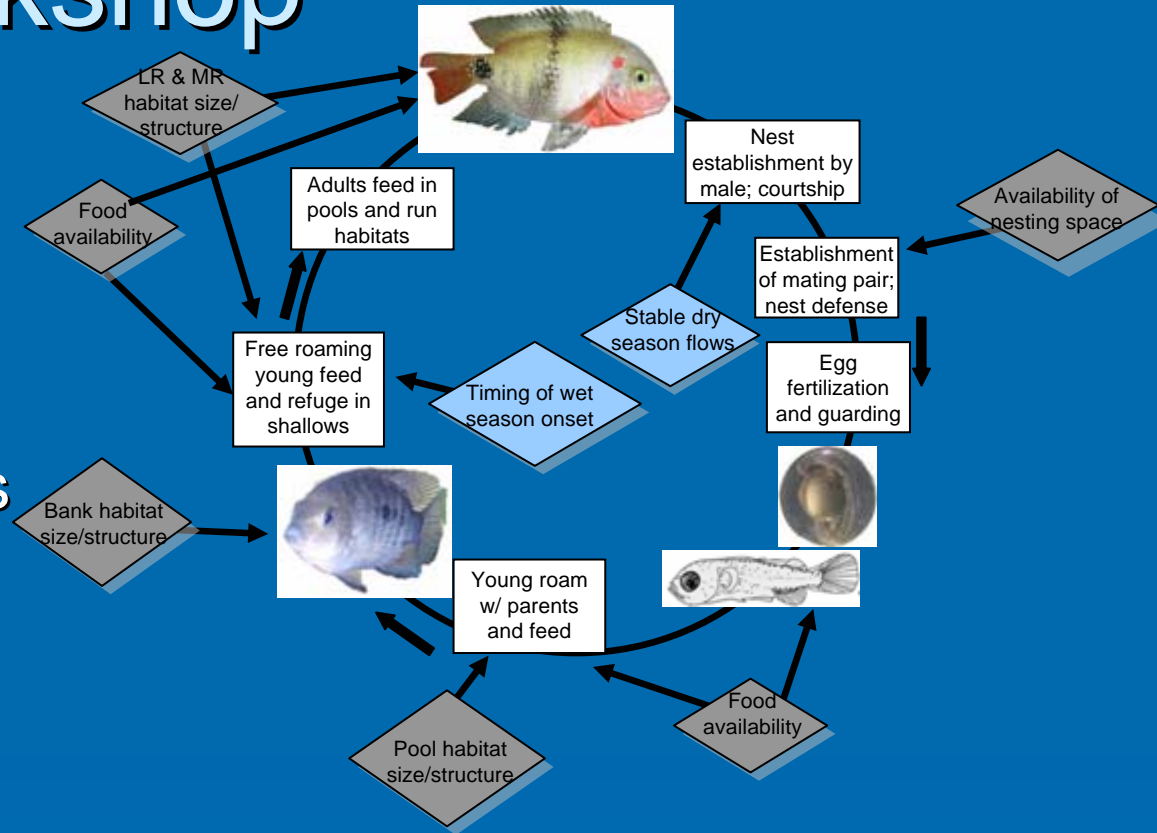


Figure 1. Recomendaciones para los caudales ambientales, Rio Patuca

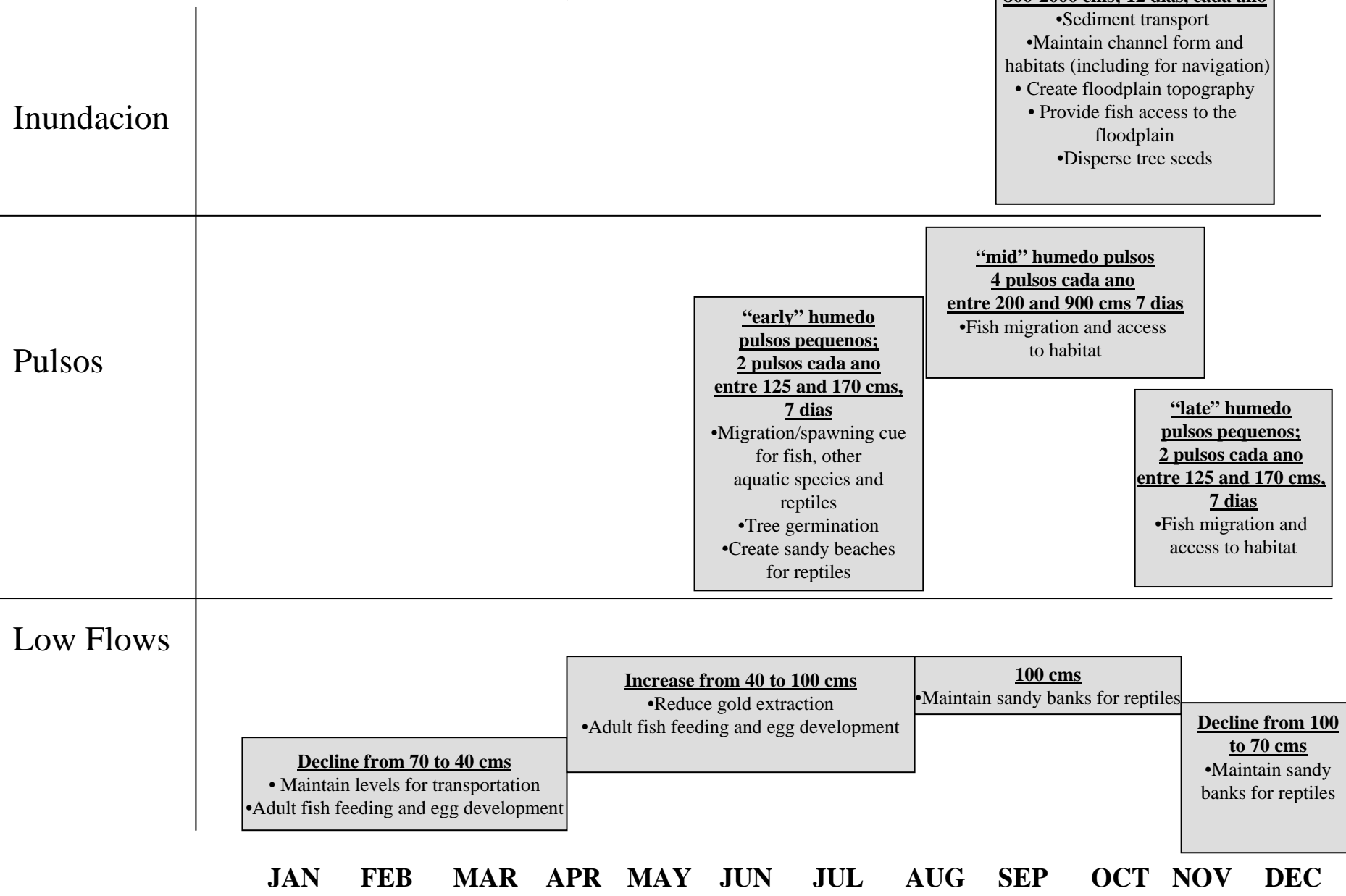
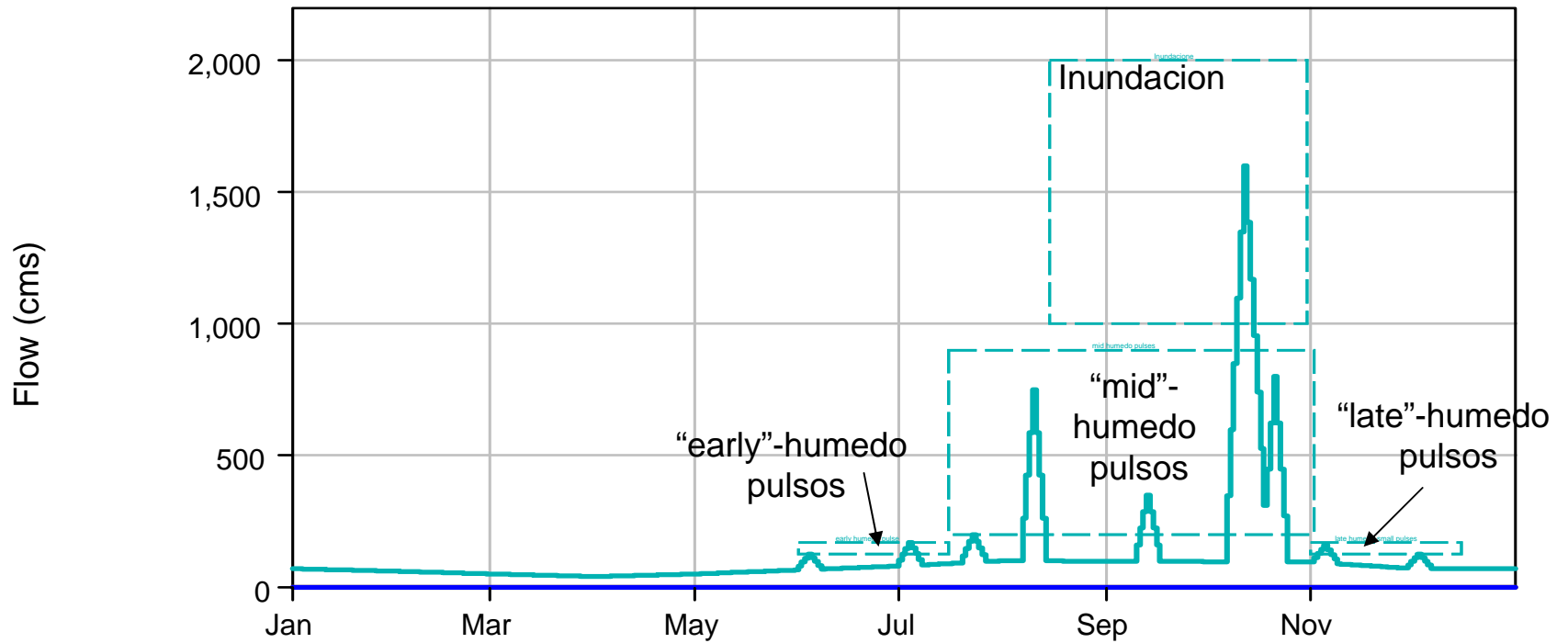


Figure 2. Example hydrograph with possible flow events within the EFC windows



Second workshop

- August, 2007
- 12 members of downstream communities (Tawahka and Miskito villages)

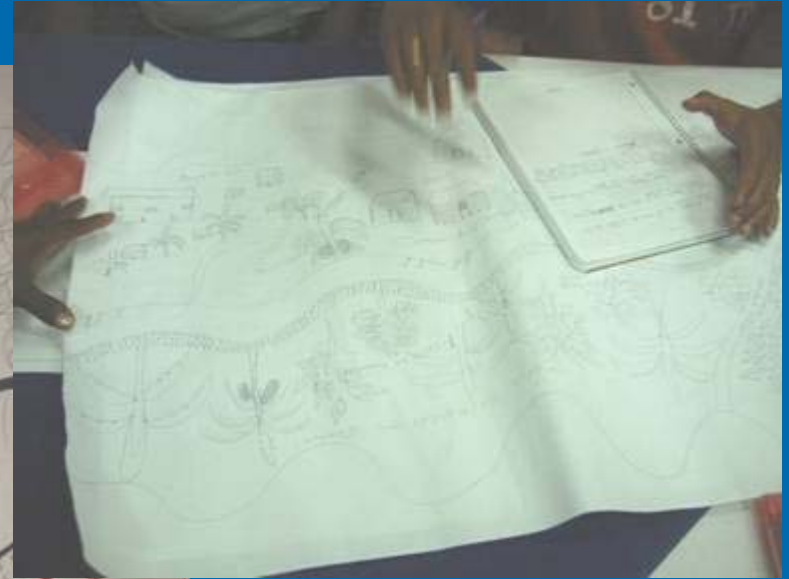
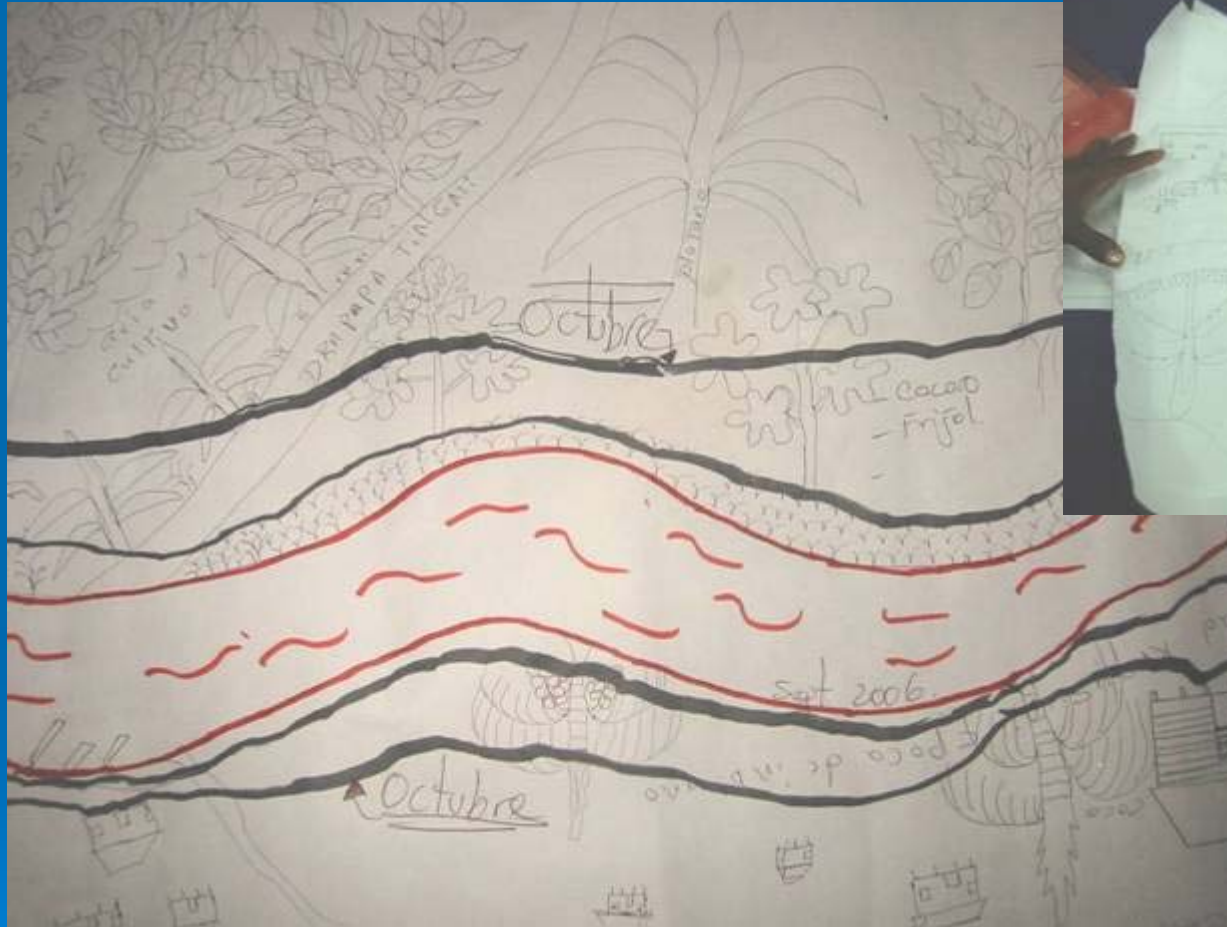


Workshop structure

- Presentations
- Opportunity for community members to share concerns and frustrations
- Three working groups: fish, agriculture, and transportation
- Various techniques for discussing flow levels

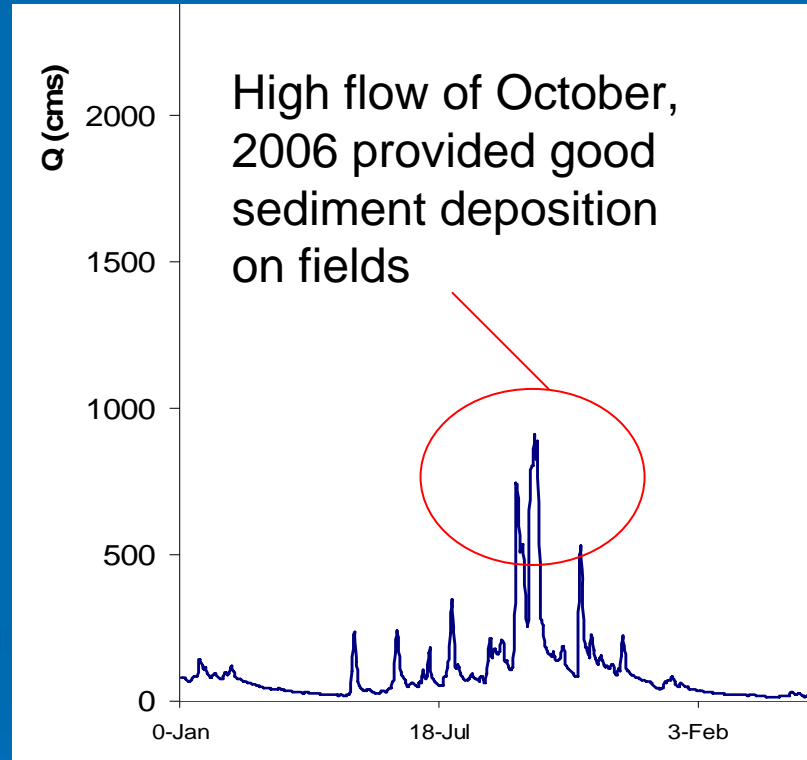


Techniques for discussion of flow levels



Depicting seasonal flow levels
on community maps

Techniques for discussion of flow levels



Describing specific months or specific years during which flows were preferable

Techniques for discussion of flow levels



Annotating photos for river stage

Pimienta (20 de Mayo)

El máximo nivel para los peces. Limpia el canal. Duración 1 semana (Jul y Oct. 2006)

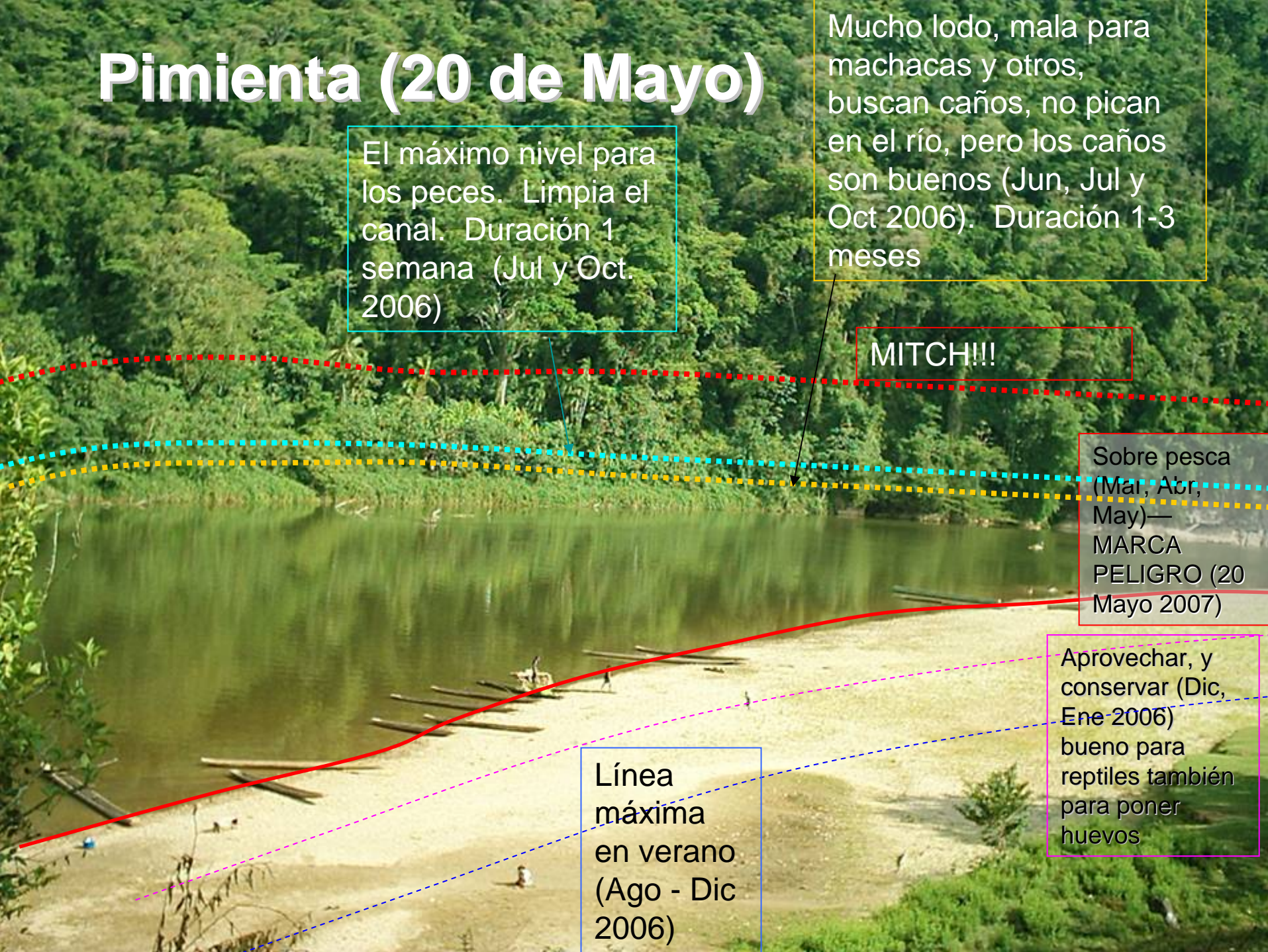
Mucho lodo, mala para machacas y otros, buscan caños, no pican en el río, pero los caños son buenos (Jun, Jul y Oct 2006). Duración 1-3 meses

MITCH!!!

Sobre pesca (Mar, Abr, May)—
MARCA
PELIGRO (20 Mayo 2007)

Aprovechar, y conservar (Dic, Ene-2006)
bueno para reptiles también para poner huevos

Línea máxima en verano (Ago - Dic 2006)



Pimienta (Mayo 20, 2007)

MITCH!!!

Mucho lodo, mala para machacas y otros, buscan caños, no pican en el río, pero los caños son buenos (Jun, Jul y Oct 2006). Duración 1-3 meses

El máximo nivel para los peces. Limpia el canal. Duración 1 semana (Jul y Oct. 2006)

Cuyameles, tepemechines inician movimientos (20 Mayo 2007)

Un nivel que no afecta a los peces Agosto – Sep/ Dic - Ene 2006).

Nivel mínimo invier (Ago, 2006).

Techniques for discussion of flow levels



Identifying sites on river where low flows hinder boat traffic

Next steps

- Translating community descriptions of important flow stages into seasonal and event discharge ranges
- Working with dam engineers and operators to implement flow regime. Government of Honduras will enforce?
- Continued capacity building program on e-flows
- Continued outreach with communities
- Support government to incorporate e-flows into official licensing processes for infrastructure development
- Support government to develop a sustainable hydro energy strategy based on this work



Lessons learned

- Communities have wide range of priorities; preferences may conflict with conservation of biodiversity
- Communities have fundamental understanding of river hydrology and ecology; primary challenge is developing common vocabulary
- Specific knowledge of flow-ecology linkages varies by flow type (e.g., what occurs during floods is somewhat unknown, for obvious reasons)



Thanks

