Pirarucu Conservation Research in the Brazilian Amazon Várzea

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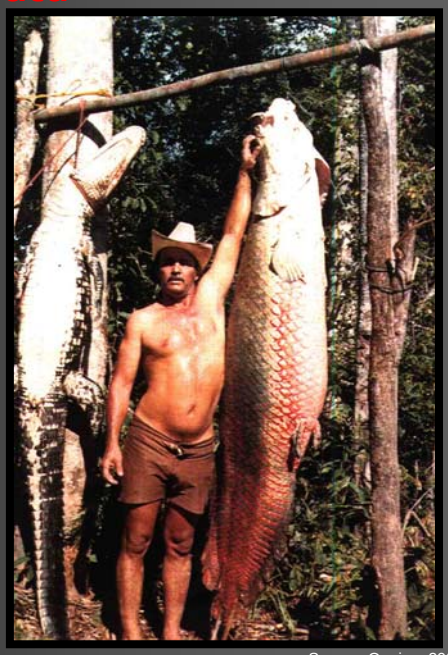
Conservation of the Pirarucu *Arapaima gigas*

- Top-of-the-web fish species
- Grows to 3 m and 200 kg
- Complex reproduction



Source: Queiroz 2000

Conservation of the Pirarucu
Arapaima gigas

- Top-of-the-web fish species
- Grows to 3 m and 200 kg
- Complex reproduction
- Obligatory air breather

The problem with pirarucu

Conservation of the Pirarucu *Arapaima gigas*

- Most important Amazon fishery 1890s
- But today is overexploited and even extirpated in a few areas
- IUCN considers pirarucu vulnerable to extinction

Sources: Goulding et al 1996; IUCN 2002; Verissimo 1895; Pereira 195
SUDEPE 1987; Queiroz and Sardinha 1999; Martinelli and Petrere 199

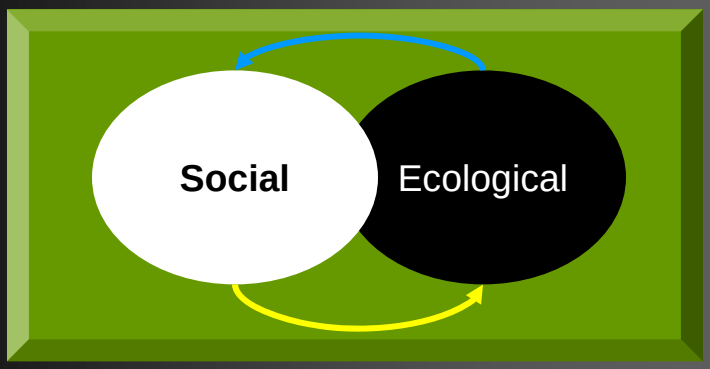
Conservation of the Pirarucu (*Arapaima gigas*)

Conservation is difficult

- Insufficient human and financial resources: size and season regulations
- Poor understanding of bio-ecology
- Poor integration of fishers into decision-making
- Open access resource regime

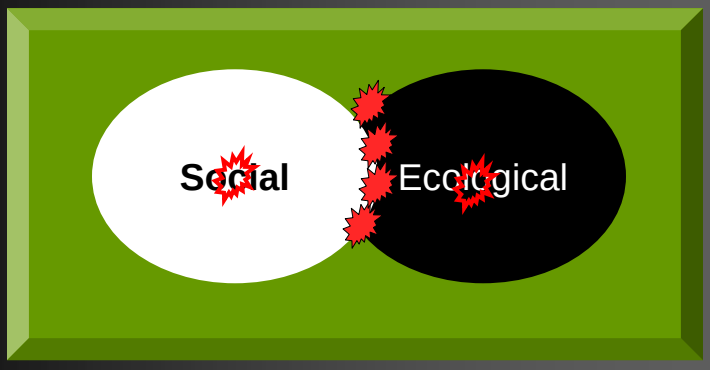
Sources: Goulding et al 1996; Junk et al 2000

The problem in concepts



The problem in concepts

"Disharmony" between social and ecological systems



Research on pirarucu ecology

Study area

Mamirauá Sustainable Development Reserve

Study area

Várzea: seasonal water level

Study area

Seasonal water level

Study area

- Seasonal water level

Study area

- Diversity of habitats

Study area

Diversity of habitats

Study area

Diversity of habitats

Study area

Diversity of habitats

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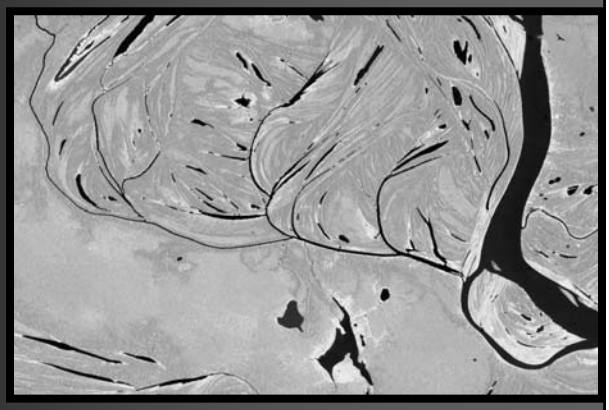
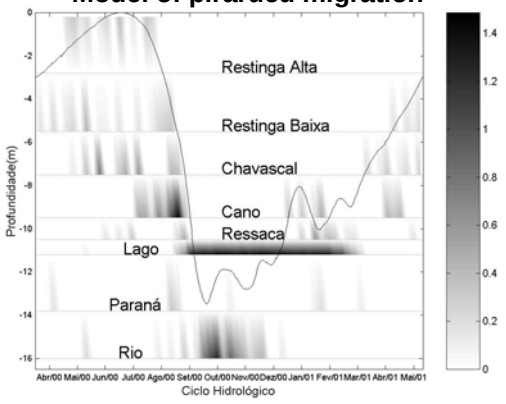
Sampled habitats for pirarucu



Migration of pirarucu

Sampled habitats for pirarucu

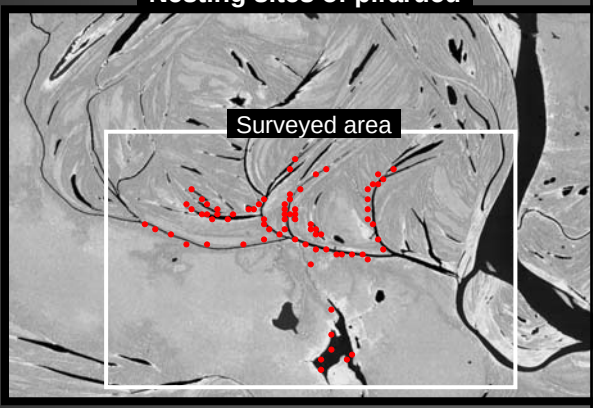
Model of pirarucu migration



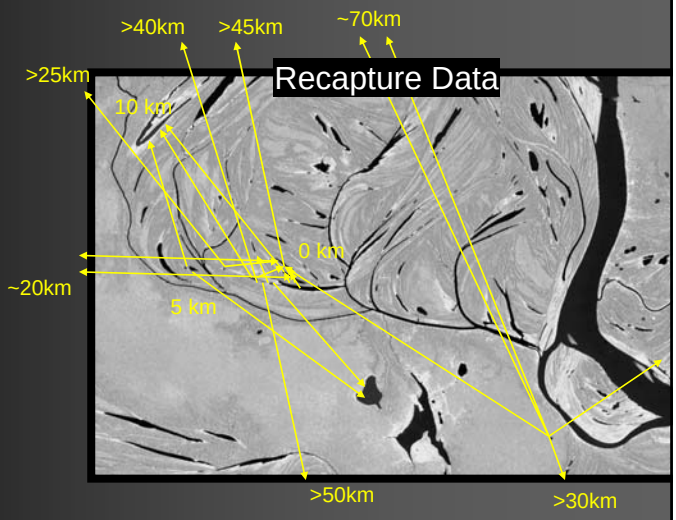
Nesting sites of pirarucu

Sampled habitats for pirarucu

Nesting sites of pirarucu



Migrating distances of pirarucu



Migration distances

Research on pirarucu fishers

Fishers' knowledge and skills

- Selected closed lakes

Fishers' knowledge and skills

- Standardized counts done by fishers

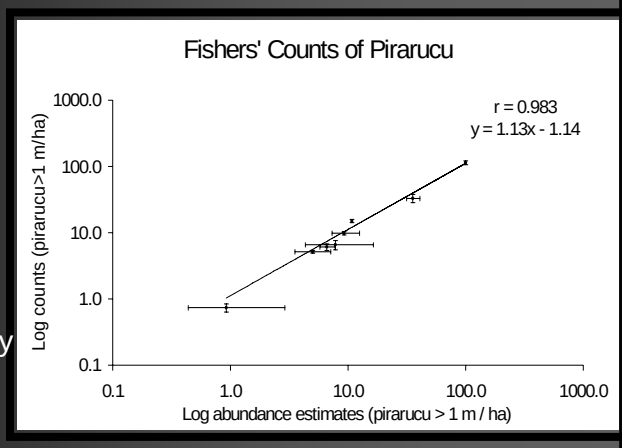
Fishers' knowledge and skills

- Mark-recapture estimates of abundance

Fishers' knowledge and skills

- Mark-recapture estimates of abundance

Fishers' knowledge and skills



- Fishers can accurately count pirarucu

Fishers' knowledge and skills

- Fishers can train other fishers to count

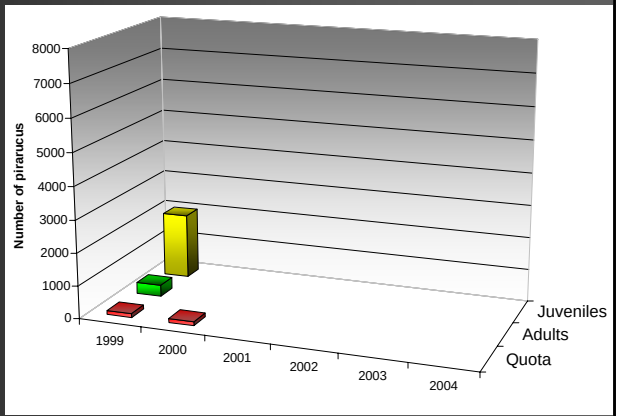
Integrating fishers into management

- Counts to determine fishing quotas

Typical community

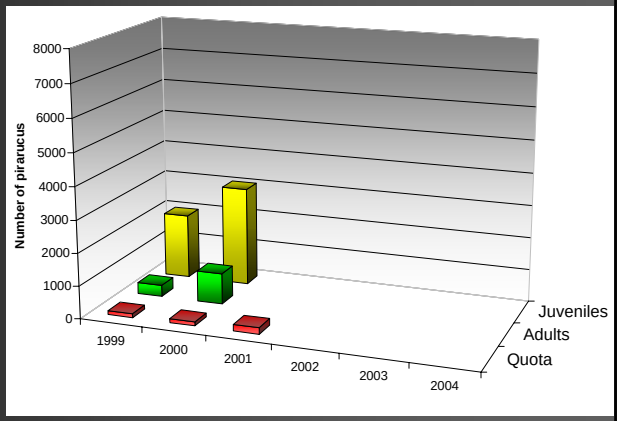
Integrating fishers into management

- Counts to determine fishing quotas



Integrating fishers into management

- Counts to determine fishing quotas



Integrating fishers into management

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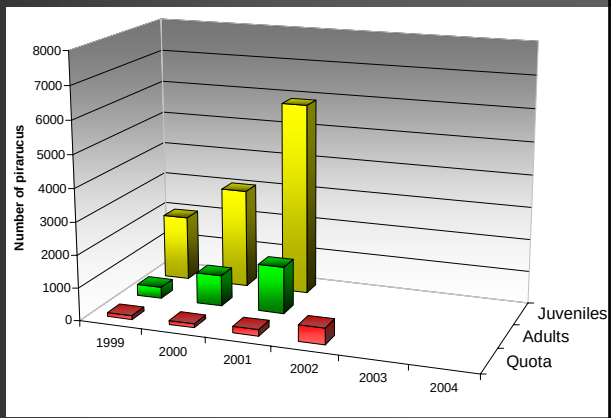

Integrating fishers into management

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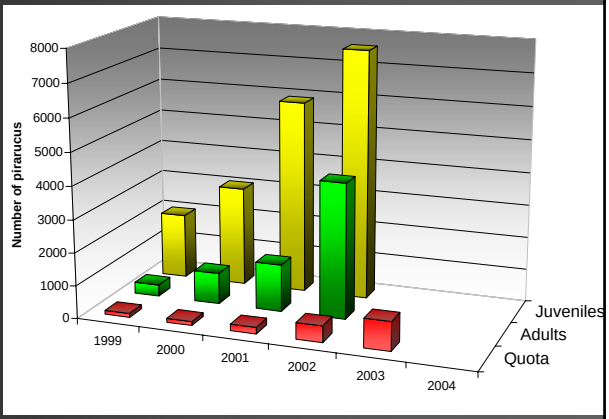

Integrating fishers into management

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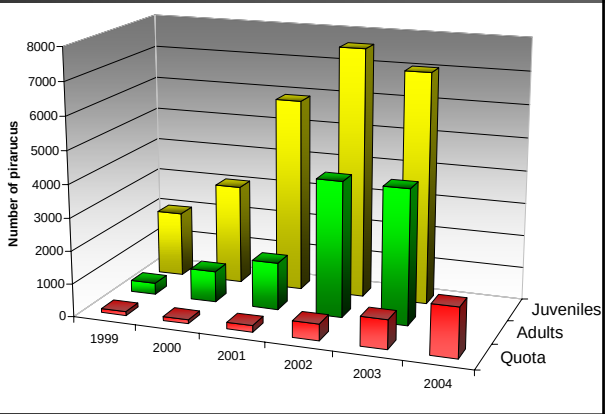


Integrating fishers into management

- Model replicated to over 40 communities in Brazil and Guyana

Integrating fishers into management

- Empowering fishers is difficult

Integrating fishers into management

- Lack of technical and institutional support

Integrating fishers into management

- Government does not properly promote fishers' management

How to Conserve Pirarucu ?

Concluding and looking at the big picture

The Várzea ecosystem

- High Productivity due to Flood Pulse
- High Ecological Value
- High Social Value

Threats to Várzea

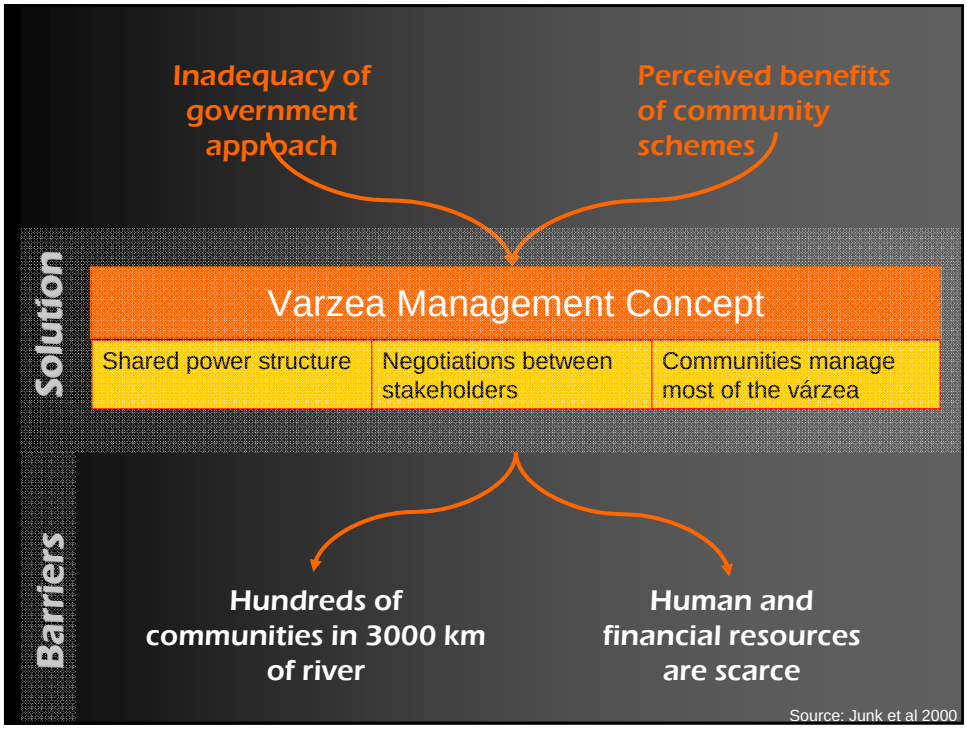
- Extirpation of Keystone Species
- Large-Scale Deforestation

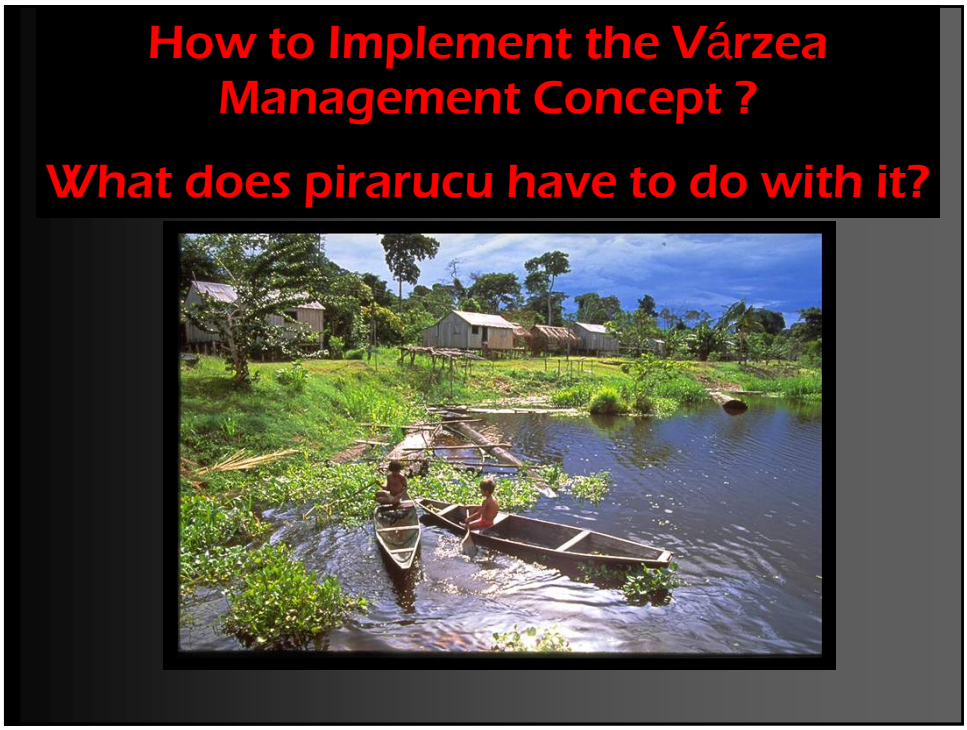
Sources: Goulding et al 1996; Junk et al 2000

Community-Based Management of Natural Resources

- Local people increasingly manage natural resources sustainably
- Sustainable Use of Fish Resources
- Sustainable Use of Forest Resources

Sources: Pinedo et al 2004; McGrath et al. 1993; 2000; Almeida et al 2002; Viana et al 2003


Inadequacy of government approach
Perceived benefits of community schemes
Solution
Varzea Management Concept
Shared power structure
Negotiations between stakeholders
Communities manage most of the várzea
Barriers
Hundreds of communities in 3000 km of river
Human and financial resources are scarce
Source: Junk et al 2000


How to Implement the Várzea Management Concept ?
What does pirarucu have to do with it?

Community-Based Management
Target the Pirarucu

- Over 50% of CBMs focus on pirarucu
- Migrate about 10 km/yr
- Relatively high commercial value

Sources: McGrath et al 1993; 1994; 1999; 2000; Pinedo et al. 2001; 2004; Viana et al 2003; Lima 1992; Ruffino 1999; Queiroz 2000; others

Community-based management
Target the Pirarucu

Pirarucu Fishery is Culturally Embedded

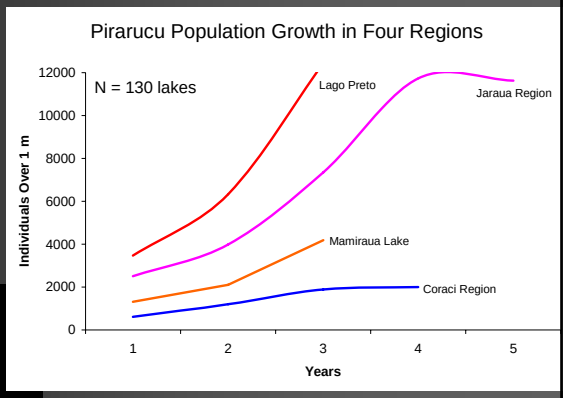
- Specialized fishers
- Fishers-based stock assessment
- Facilitates effective management

Source: Castello L. 2004. North American Journal of Fisheries Management

Community-based management
Target the Pirarucu

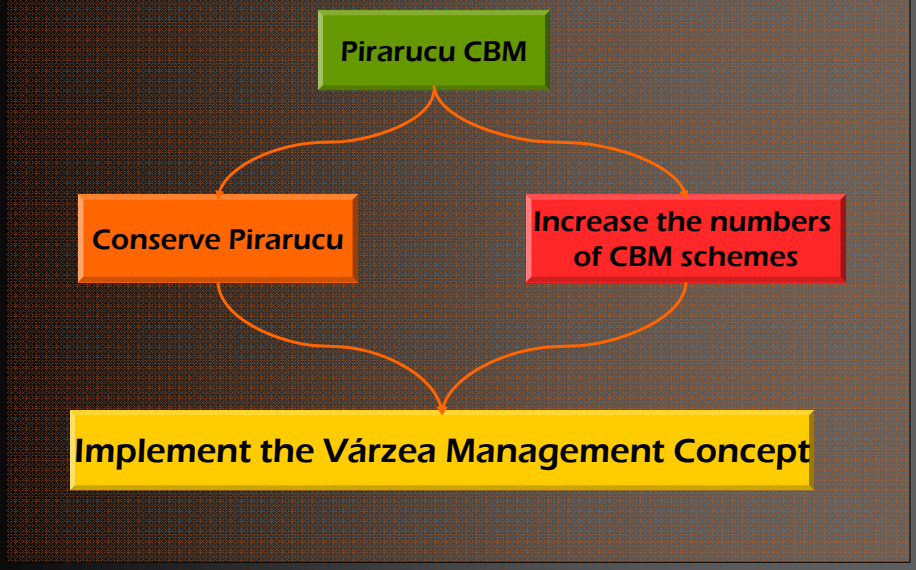
Pirarucu populations have high growth rates (about 100% per year in four managed areas)

Provide quick and positive feedback on management efforts



Source: Unpublished data of the author

Pirarucu CBM: "Keystone Socio-ecological Process"



Pirarucu CBM provides starting point for implementing várzea management by:

- Determining single goal for stakeholders' negotiation
- Promoting successful stakeholders' negotiations
- Strengthening community institutional structure
- Quickly and cheaply expanding the number of CBM schemes

Limitations of this approach

Information is needed on:

- Fishers' livelihoods, knowledge, skills, and needs
- Biology and ecology of pirarucu
- Functioning of community based management

Comments, questions, and critiques…