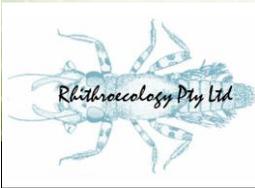


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# Aquatic Invertebrates and Mekong River Flows

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What are invertebrates?

## What are invertebrates?

Animals without backbones

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Animals without backbones:

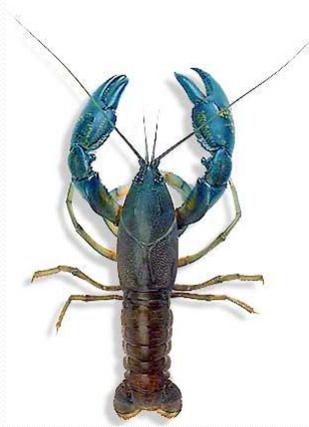
Insects



## What are invertebrates?

Animals without backbones:

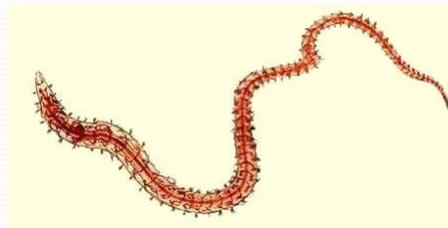
Crustaceans



## What are invertebrates?

Animals without backbones:

Worms (oligochaets and polychaets)



## What are invertebrates?

Animals without backbones:

Molluscs (snails and mussels)



## Why are invertebrates important?



## Why are invertebrates important?

### Biodiversity

There are more species of beetle than any other group of living things



## Why are invertebrates important?

### Ecological processes

Invertebrates convert algae and detritus into forms that can be consumed by other organisms.

## Why are invertebrates important?

Ecological indicators

Invertebrates have been used more than any other group as ecological indicators of river health.

Easy to collect

Sensitive

## Why are invertebrates important?

Food for people and fish



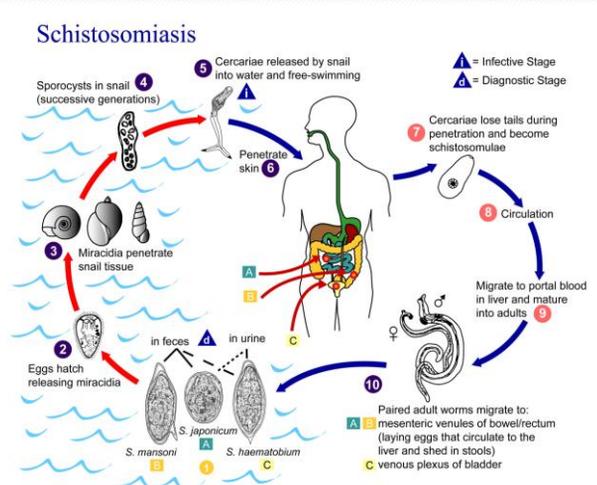
## Why are invertebrates important?

Food for people and fish



## Why are invertebrates important?

Parasite hosts:  
Schistosomiasis,  
heartworm,  
liver fluke



## How are invertebrates influenced by flows?

Many invertebrates living in rivers require moving water to feed



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Many invertebrates living in rivers require moving water to feed



## How are invertebrates influenced by flows?

Many invertebrates living in rivers require moving water to provide sufficient oxygen to support respiration



## How are invertebrates influenced by flows?

All invertebrates are habitat specific



## How are invertebrates influenced by flows?

All invertebrates are habitat specific

The flow regime is a major factor in controlling habitat:  
e.g. stones, sand, silt, bedrock, accumulations of detritus



## What do we know about Mekong Invertebrates?

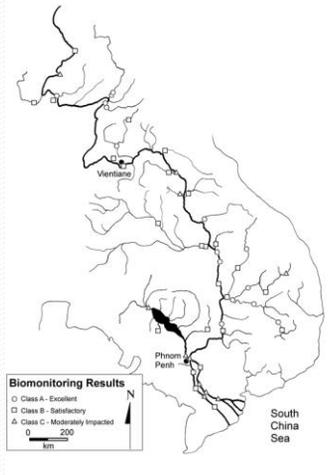
Two sources of information:

- The MRC Bioassessment study conducted between 2004 and 2008
- A number of detailed studies on particular taxa such as snails

## What do we know about Mekong Invertebrates?

- **The MRC Bioassessment Study**

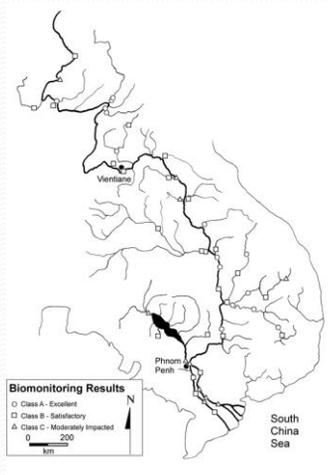
- Published data on 51 sites
- Developed 3 metrics used for 4 indicator groups
- Provides a baseline to assess future changes



## What do we know about Mekong Invertebrates?

- **The MRC Bioassessment Study**

- Species Richness
- Abundance
- Average Tolerance Score (ATSPT)
  - Diatoms
  - Zooplankton
  - Littoral Invertebrates
  - Benthic Invertebrates





## What do we know about Mekong Invertebrates?

Detailed studies on particular taxa (eg snails)

Highlight biodiversity issues

Less useful for this project



## What do we know about Mekong Invertebrates?

All have limited distributions – determined by:

- Habitat
- Water velocity
- Water temperature
- Salinity
- Water quality



## What do we know about Mekong Invertebrates?

We have little or no information about the distributions of most invertebrate species along the river.

Even for important species such as *Neotricula aperta*

We know some locations (Khone Falls, the three Ss) but not a comprehensive distribution



## What do we know about Mekong Invertebrates?

We have little or no information about the life histories of any of the invertebrates.

Some information on emergence season, nothing on growth rates.



## What are possible invertebrate indicators?

Invertebrates will respond to changes at a variety of scales. At the scales we are considering they will primarily respond to changes in habitat area and subtle changes in habitat condition.



## What are possible invertebrate indicators?

Invertebrates will respond to changes in habitat area and subtle changes in habitat condition.

Previous study listed 11 invertebrate indicators:

## What are possible invertebrate indicators?

- Abundance of heptageniid mayflies (stony habitat)
- Abundance of baetid mayflies (sandy habitat)
- Abundance of river weed (cash crop)
- Abundance of dry season emergence (fish food)
- Abundance of palingeniid mayflies (silty habitat)
- Abundance of snails (food for people)
- Diversity of snails
- *Neotricula aperta* (schistosomiasis host)
- Abundance of bivalves (food for people)
- Abundance of polychaet worms (salinity indicator)
- Abundance of shrimps and crabs (food for people)

## What are possible invertebrate indicators?

Invertebrates will respond to changes in habitat area and subtle changes in habitat condition.

- Bioassessment indices



## What are possible invertebrate indicators?

Invertebrates will respond to changes in habitat area and subtle changes in habitat condition.

- Insect emergence  
(above Kratie)



## What are possible invertebrate indicators?

Invertebrates will respond to changes in habitat area and subtle changes in habitat condition.

- Polychaets in lower river (below Kratie)

Tolerant of salinity