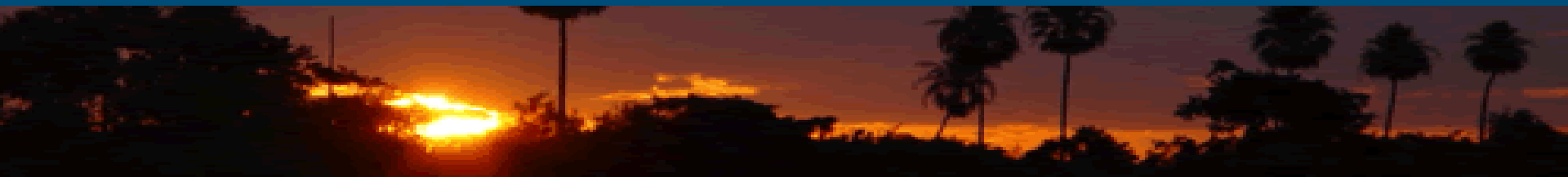




Federal University of Mato Grosso do Sul  
Campo Grande, MS, Brazil

**Application of ecological sanitation and  
permaculture techniques: *food and water security  
for indigenous tribes and rural areas in Brazil***

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# Location



# Background

## Kaiowa Tribe: situation overview

- Poverty
- **Indians lost their identity (alcohol abuse, suicides)**
- Dependency on government food distribution
- **No river or water springs on their land**
- Available water: FUNASA's well (distributed by taps and laundry areas – doesn't reach whole population)
- **Poor soil**
- Deforestation



# Background

## Kaiowa Tribe: situation overview

- Scenarios - water
  - Area where no water is provided
  - Area provided with taps
  - Area provided with laundry facilities





# Background

## Kaiowa Tribe: situation overview

- Scenarios - sewage

Open defecation - latrines

Funasa module (mostly not accepted)



# Background

## Kaiowa Tribe: situation overview



Challenge on project implementation:

young children and old people don't speak Portuguese

Political conflicts within the tribe



# Objectives

**Main objective** finding sustainable and accepted sanitation options, where FUNASA may financially help with implementation and the community itself can manage and improve their quality of life.

- To promote and transfer the use of simple technologies based on ecological sanitation and permaculture concepts.
- To provide sanitation, supporting the rational use of water and enabling the food production in indigenous and/or rural communities.



# Objectives

- The project aims the capacity building of the population so that, when necessary, they can build, operate and manage the decentralised systems, strengthening their communities by promoting health and self-sufficiency on food production.





# Methodology

- Research team visits the tribe 1 week/month (400 km)
- Meetings, surveys, workshops
- Educational training (school teachers) and special environmental education training on the complete system
- Systems construction and implementation
- Systems sampling, monitoring and maintenance
- Physico-chemical and bacteriological analyses of treated greywater and rainwater
- Parasitological tests: samples from arborloo pit and users.



# Methodology

- workshop on construction techniques using bamboo
- construction of 2 rainwater harvesting systems
- construction of 20 arborloo-type toilets
- constructed wetland for treating the school kitchen greywater (followed by a vegetable garden)
- 2 banana tree circles treating the greywater produced in 2 communal laundry areas
- 1 low tech urinal in the school (connected to a flower garden + greywater).

# Results - Rainwater





# Results – banana tree circles (laundry area)





# Results – constructed wetland



26-31 aug 07

# Results – vegetable garden (greywater)



# Results – urinal, flower garden



# Results - arborloo





# Results - arborloo





# Results - arborloo

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## Arborloo 1

*Ascaris lumbricoides* eggs

*Hymenolepis nana* eggs

*Ancylostoma duodenale* eggs

*Strongyloides stercoralis* larvae

## Arborloo 2

*Iodamoeba* cysts

*Escherichia coli* cysts

*Ancylostoma duodenale* eggs

*Strongyloides stercoralis* larvae

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Causes: bad hygiene habits, lack of infrastructure and basic sanitation and cultural habits

Ongoing work: samples - arborloo and users, questionnaires (health, habits, symptoms, etc.)

Survey: health care centre for indigenous people

Looking for evidences that education programme together with ecosan and permaculture techniques improved their health conditions (by the end of the project).



# Conclusions

- Good acceptance on the chosen techniques, specially the arborloo toilet.
- Difficulties for the community to work as a group (household level activities presents better results).
- Difficulties with the maintenance of the toilets: appearance of flies and bad odour (non addition of ashes or saw dust).
- Hygienic condition of the toilets greatly improved after new visits to the houses.
- Achievements improved after educational training at school.



# Conclusions

- For the success of the project implementation it is of paramount importance the educational work and population participation, which goes beyond the transfer of technology.





Thanks for the attention!