

The North Rupununi Adaptive Management Process (NRAMP) 2008

Problem Solving for Natural Resource Management

Level 2 - Community Course

Darwin Initiative Guyana Partnership

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The Open University
Iwokrama International Centre for Rain Forest
Conservation and Development
Environmental Protection Agency
North Rupununi District Development Board
University of Guyana



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1. Introduction

1.1 What is NRAMP

The North Rupununi Adaptive Management Process or NRAMP is a decision making tool which individuals, communities and institutions can use to develop plans to manage day to day livelihoods activities and natural resource management scenarios. The process uses the learning cycle which forms the basis for every decision and action that we make and enact in our everyday life..

1.2 Course aims

This course aims to strengthen the capacity of community members to understand the North Rupununi Adaptive Management Process in order to develop suitable adaptive strategies for management of natural resources and community livelihoods within the North Rupununi.

The NRAMP Community Course is eleven days in length and comprises of five different scenarios, each dealing with a different natural resource or livelihood management issue. The course is meant to be implemented in five sections in accordance to the scenarios, and not as one continuous course. This is so that course participants will have time in between sessions to reflect on the content of the scenario previously covered. Additionally, because the course is meant for community members, it is necessary that the implementation does not cause participants to neglect or forsake their individual and community livelihoods while pursuing the course, hence the necessity for space between implementation of scenarios, so that no more than five continuous days are required from community members to participate and complete the scenario training.

1.3 Course content

The course takes a problem-solving approach to building the capacity of community members to implement the NRAMP. As such, the course is divided into five problem scenarios which participants work through, and these are as follows:

- 1) Animal / human conflict – This is aimed at providing community members with the background knowledge that is needed to develop and implement plans to manage conflict situations between local communities and wildlife. This section of the course is specifically aimed at managing the current conflict between local communities of the North Rupununi and the endangered Black Caiman (*Melanosuchus niger*).
- 2) Overharvesting/exploitation – This section of the course is based on the interest of communities wanting to ensure that the natural resources that they depend on are used in a sustainable manner. This would ensure the continuity of the resources for future generations. At the same time, the communities would also like to pass on the knowledge of traditional management of resources to the younger generation.
- 3) Food and water security – In the North Rupununi communities are sometimes faced with situations where the farms are damaged when rains come too soon and more than is expected. This destruction of farms in turn affects the availability of cassava to make farine and cassava bread. Therefore, a system for being prepared to handle these changes is necessary. This section of the course is aimed at providing information and a process for developing plans to prevent and mitigate these occurrences.
- 4) Ownership – Local communities are sometimes taken advantage of by outsiders because there is not enough awareness of the legal rights of communities to manage their lands and the resources found in these lands. To be able to handle and ensure that persons are within

the remit of the law, awareness of these rights is primary. This section of the course is geared at providing community members with knowledge with regards to their rights, so that they are not taken advantage of in discussions or negotiations on land or resource use within their home region.

- 5) Livelihood enterprise development - Managing community natural resource business initiatives is an important component of community development. Many times communities step into enterprises without first critically analysing the situation and developing a definite plan of action for ensuring that the business meets community development and is sustained. This section of the course is aimed at providing communities with the knowledge and skills on the process for planning, developing, implementing and managing sustainable community enterprises within their villages either individually or in partnership with each other.

1.4 Course teaching techniques

The course incorporates several methods of teaching. These include but are not limited to the following: oral presentations; demonstrations; group work; interactive activities; reading; recollection; participatory techniques; and critical analysis and review.

It is important that facilitators for the community course continually assess the level of understanding of the concepts by the participants, so that approaches used to explain or emphasize concepts can be adapted or changed accordingly. It does not make much sense to run the course without this kind of assessment, as at the end of it, the learning outcomes will not be achieved.

1.5 Course assessment

The community course is meant to be undertaken by community members who have a keen interest in natural resource and livelihood management within their villages. The course is structured in a manner which recognizes that not all community members would have been afforded the opportunity to pursue formal education aside from basic primary level education, and that community members who engage in the course would have different levels of capacity. For this reason, the assessment component of the course is not based on marks or percentages achieved, but rather are based on a more informal method of assessment, based on the activities that the participants carry out. The reason for having this method of assessment is because the community course is meant to be carried out in five different sections. Having a formal evaluation, with marks allocated may cause participants who have had little formal education to feel sidelined when their colleagues, who have had more experience with formal education, perform better at tests. This might result in participants not wanting to continue the course when the next scenario is to be implemented.

There is a semi-formal written method of assessment that can be implemented that will perform two functions. This is a daily evaluation of the session based on the activities, resources and time allocated to complete activities. This method of evaluation will allow participants to freely comment on their feelings and understanding of material covered in the day's session. This will provide the facilitator with information on the level of understanding of the different concepts by participants. The facilitator can then use this to guide the pace of the sessions, and to know what course content needs to be re-explained.

The format of this evaluation is to provide participants with pieces of blank paper, and then ask the following four questions:-

1. How did today's session go? Facilitators will provide the participants with smaller questions that will assist participants in representing their feelings of the day's activities. These questions can be used to guide participants in responding:- how did the session make you feel, did you feel as if you learnt something new, or understood something you already knew, better?
2. Were there enough explanations given, and were they simple to understand? Based on the explanations given for the day, participants will be allowed to express their views on concepts explained during the day. Facilitators should encourage participants to reflect on what concepts they understood clearly and those that they did not understand fully, and record these on their evaluation sheets.
3. Were the resource sheets provided enough and simple to understand? This will allow participants to express their views on the materials provided in their resource books. Facilitators should encourage participants to identify particular sections where they found it difficult to understand fully what was being explained. This will also allow facilitators to gauge whether the resource materials provided are relevant to the participants.
4. Was enough time given for you to understand and complete the activities given during the course of the day? This will give the participants an opportunity to express their views on the pace in which the training is being conducted, and will give facilitators an understanding of whether concepts were grasped by participants in the recommended time for the training sessions, which can then be reviewed based on the participants' responses. It will also give facilitators some insight into how well concepts and activities were understood.

1.6 Resources for course implementation

For the implementation of the course, there are particular resources that would be required. These include:-

1. NRAMP 2008
2. NRAMP Community Course Resources for participants
3. NRAMP Community Course Guidelines for facilitators
4. Map of the Rupununi Core Area
5. Blackboard
6. Tables and chairs in a location that will allow participants to focus on the training and participate in group activities
7. Stationary including flip chart paper, coloured markers, chalk, note books for participants, pens, pencils, rulers, graph paper, and coloured tacks.
8. Miscellaneous items, please check session plans for details on these

PROBLEM SCENARIO	KNOWLEDGE/SKILLS DEVELOPED	LESSON PLANS	TEACHING TECHNIQUES	DURATION
<p>Animal / Human Conflict</p> <p>Black Caiman and communities. Populations of caiman are on the increase, people are losing their hunting dogs as well as they are being attacked by caimans. People are therefore actively seeking the caimans that are threats and killing them.</p>	Ecology and population of the Black Caiman	1. Understanding the learning cycle approach in the NRAMP	Tutor session on learning cycle and facilitation of discussion	1 hour
	Laws governing the Black Caiman	2. Understanding food chains and webs	Tutor sessions on food chains, food webs and the roles of large predators	1 hour
	Traditional management systems for the Black Caiman by communities		Interactive activities on ecological concepts	
	Past and recent Black Caiman attacks on people and their livestock	3. Understanding the nature of attacks on people by large predators	PV videos on community members experiences with the large predators such as the Black Caiman, and on the distribution of the Black Caiman	1 hour, 15 min
	Reading			
Oral presentations		4. Understanding national laws for protecting species	Group activities	3 hours
Group working		5. Understanding local beliefs and practices for management of species	Presentation Skills	
			Reading maps	2 hours
			Working in groups to critically analyze	5 hours for completion

PROBLEM SCENARIO	KNOWLEDGE/SKILLS DEVELOPED	LESSON PLANS	TEACHING TECHNIQUES	DURATION
			situations	of log frame Total number of hours = 14 This is equal to 3 days
<p>Overharvesting/ Exploitation</p> <p>Communities would like to ensure that the natural resources that they depend on are used in a sustainable manner. This would ensure the continuity of the resources for the future generations. At the same time, the communities would also like to pass on the knowledge of traditional management of resources to the younger generation.</p>	<p>Knowledge of food fish species found in the North Rupununi and their ecology</p> <p>Knowledge of wildlife of the North Rupununi and their ecology</p> <p>Knowledge of traditional and current practices for wildlife and fisheries management</p> <p>Knowledge of national and village laws on harvesting resources (fisheries, wildlife, timber, NTFPs)</p>	<p>1. Review of NRAMP</p> <p>2. Understanding the ecology of biodiversity in the North Rupununi</p> <p>2. Understanding traditional and non-traditional management systems for resources</p> <p>3. Understanding how to do monitoring and to link the information from monitoring to decision making</p>	<p>Discussion</p> <p>Handout on biodiversity of the North Rupununi</p> <p>Handouts on the Arapaima Management Plan</p> <p>Interactive activity on fishing practices on fish populations</p> <p>Presentation skills</p> <p>Microsoft Excel and Microsoft Word</p>	<p>30 min</p> <p>3 hours</p> <p>3 hours</p> <p>8 hours</p> <p>Total number of hours = 15 This is equal</p>

PROBLEM SCENARIO	KNOWLEDGE/SKILLS DEVELOPED	LESSON PLANS	TEACHING TECHNIQUES	DURATION
	Knowledge of monitoring techniques for understanding population changes for species		Participatory techniques PV video	to 4 days
Food and water security Communities are sometimes faced with situations where the farms are damaged when rains come too soon and more than is expected. This destruction of farms in turn affects the availability of cassava to make farine and cassava bread. Therefore, a system for being prepared to handle these changes is necessary.	Knowledge of the flooding regime of the North Rupununi Knowledge of effects of El Nino and La Nina and adaptive strategies Knowledge of the impacts of erosion on land and water systems Knowledge of water quality parameters and adequate levels suitable for maintaining system equilibrium Knowledge of traditional farming practices	1. Review of NRAMP 2. Understanding the water cycle and levels of flooding in the North Rupununi Understanding concepts of weather and climate, and the phenomenon of climate change Understanding soil types, causes, and effects of erosion and methods of preventing erosion 3. Understanding water quality, and guidelines for monitoring water quality 4. Resolving conflicts over land and water resources in the North Rupununi	Discussion Handouts Mapping Microsoft Word, Microsoft Excel Interactive activities Presentations Participatory techniques Role-playing	30 min 2.5 hours 2.5 hours 1 hour 3 hours

PROBLEM SCENARIO	KNOWLEDGE/SKILLS DEVELOPED	LESSON PLANS	TEACHING TECHNIQUES	DURATION
		5. Developing plans for food security in the North Rupununi	Group work	3 hours Total number of hours = 12.5 This is equal to 2 days
<p>Ownership</p> <p>Communities are sometimes taken advantage of by outsiders, because there is not enough awareness on the legal rights of communities to manage their lands and the resources found in these lands. To be able to handle and ensure that persons are within the remit of the law, awareness of these rights is primary.</p>	<p>Knowledge of Amerindian Act</p> <p>Knowledge of Mining Act</p> <p>Knowledge of Forest Act</p> <p>Knowledge of Fisheries legislation</p> <p>Knowledge of the Iwokrama Act</p> <p>Knowledge of functions and roles of Supernumerary Constables and village</p>	<p>1. Review of NRAMP</p> <p>2. Understanding laws and regulations for natural resource management</p>	<p>Discussion</p> <p>Group working</p> <p>Discussion</p> <p>Presentations</p> <p>Participatory techniques</p> <p>Microsoft Word</p>	<p>30 min</p> <p>8 hours</p> <p>Total number of hours = 8.5 This is equal to 1.5 days</p>

PROBLEM SCENARIO	KNOWLEDGE/SKILLS DEVELOPED	LESSON PLANS	TEACHING TECHNIQUES	DURATION
	councils Knowledge of past community leadership systems			
Livelihood Enterprise Development Managing community natural resource business initiatives is an important component of community development. Many times communities step into enterprises without first critically analysing the situation and developing a definite plan of actions for ensuring that the business meets community development and is sustained.	Knowledge of the principles of livelihood development Knowledge of small business management Knowledge of community development plans	1. Review of NRAMP 2. Livelihood activities and planning businesses in the North Rupununi	Discussion Presentations Microsoft Word Interactive activities Participatory techniques	30 min 8 hours Total number of hours = 8.5 This is equal to 1.5 days

2. *Scenarios*

2.1 Scenario 1 - Animal human conflict

2.1.1 Session outline

Upon commencement of the session, facilitators should explain the objectives or the reason for embarking upon training for the scenario. It should be made clear that the aim of the session is to develop a relevant and workable plan for managing conflicts between people and wildlife, using the North Rupununi Adaptive Management Process.

2.1.2 Session 1 - Understanding the learning cycle in NRAMP

Topics to be covered: The NRAMP principles of adaptive, participative, holistic, evidence based, and practical; the learning cycle.

Duration of session: 1 hour

Resource sheets for session:

1.1 What is the learning cycle approach in the NRAMP? NRAMP 2008

Session plan:

Content	Student Activity	Materials Required	T e a c h i n g techniques
NRAMP principles	Facilitators introduce five NRAMP principles and lead discussion on meaning of these to participants.	Flip chart sheets, coloured markers coloured chalk, blackboard	Explanation of terms Discussion
The learning cycle	<p>Facilitators must take the participants through the NRAMP using a situation that participants can relate to based on their day to day life. The scenario for the activity describes the observation phase that the facilitator can use to guide participants in using the NRAMP to manage the situation. Facilitators should stress that the NRAMP follows the learning process which we all use in our day to day lives for managing situations.</p> <p>Facilitators will guide the participants through the process, first by taking all the facts out of the situation. Then, the strengths and weaknesses of the current situation towards achieving the man's goal should be explored. After doing this, participants should then develop a plan for achieving the goal of getting to the farm before night, including activities the man would need to do to achieve his goal.</p> <p>The following is meant to make the NRAMP less intimidating. The learning process is used daily by each of us as we live our lives.</p>	Flip chart sheets, coloured markers coloured chalk, blackboard	<p>Explanation of terms</p> <p>Working in groups</p> <p>Presentation skills</p>

2.1.3 Session 1.2 – Understanding food chains and food webs

Topics to be covered: Food chains and food webs; trophic levels (producers, primary consumers, secondary consumers, tertiary consumers, decomposers); herbivores, carnivores and omnivores.

Duration of session: 1 hour

Resource sheets for session:

1.2 What are food chains and food webs?

Session plan:

Content	Student Activity	Materials Required	Teaching techniques
<p>Food chains are a sequence of living things through which energy moves from one onto another.</p> <p>Food webs are many food chains that are interconnected.</p> <p>Each group of organisms has specific roles in a food web; however when parts of the food web experience much pressure, there is chain reaction where the other living organisms also are affected.</p>	<ul style="list-style-type: none"> - Facilitators will ask a participant to volunteer to tell the entire group what he/she had for dinner. The facilitator will start a food chain with name of the participant and show that that person ate what was identified as being eaten for dinner. The facilitator will encourage participants to identify the other organisms that might be a part of this food chain. (5 mins) - Group activity of preparing one food chain that happens around us. Participants will work in groups of 3 persons to develop a food chain that happens in the area, which will then be presented to the entire group. (15 mins) - Group activity of preparing one food web that happens around us. Participants will work in groups of 3 persons to develop a food web that happens in the area, which will then be presented to the entire group. (20 mins) - Together the groups will discuss the ways in which food chains that were presented (that occur in the Rupununi) are affected or changed by the activities of people.(20 mins) 	<p>Flip chart sheets, coloured markers, coloured chalk, blackboard</p>	<ul style="list-style-type: none"> Explanation of terms Working in groups Presentation skills Observation Recalling on surrounding environment

2.1.4 Session 1.3 – Understanding the nature of attacks on people by large predators

Topics to be covered: Predator/prey relationships and man’s role in this relationship; large predators and their basic ecology in the North Rupununi; people and predator conflicts (why and how); ways of resolving and minimizing conflicts between people and large predators.

Duration of session: 1 hour 15 minutes

Resource sheets for lesson:

1.3a What are predators and prey?

1.3b Large predators and conflicts with people

Session plan:

Content	Student Activity	Materials Required	Teaching techniques
<p>Definition of predators and local examples of predators.</p> <p>Definition of prey are local examples of prey-</p> <p>The Predator – Prey Relationship Chart</p>	<p>Participants will each be given a flashcard with the name of an animal on it. These cards would have the names of local species of predators and prey. Participants will then be asked to identify themselves as predator or prey. Predators will be asked to make a large circle, and the prey will be asked to make a circle within the predator circle in a defined area. Predators will then be asked to take prey to ensure its survival. There will be no communication between predators. When there is no prey left, the scene that remains will be explained using the predator – prey chart. (10 mins)</p>	<p>Local animal flashcards, coloured chalk, safety pins, teaching aid depicting the predator – prey relationship chart</p>	<p>Explanation of terms and concepts – predator, prey, and predator/prey relationship</p> <p>Asking questions to evaluate whether concepts are understood by participants</p> <p>Giving activity instructions and guidelines</p>
<p>Large predators and people, examples of conflict and attacks</p> <p>What causes large predators to attack people and livestock?</p>	<p>Participants will be asked to work in groups of 3-4 persons. Each group will be asked to develop a list of large predators that are in conflict with people in their village, and to also provide reasons why these conflicts are present. Each group will present its list to the entire group. There will then be a discussion based on the</p>	<p>Coloured chalk, flip chart sheets, coloured markers, coloured chalk, blackboard</p>	<p>Giving activity instructions and guidelines</p> <p>Summarising group presentations</p>

Content	Student Activity	Materials Required	Teaching techniques
	presentations from the work groups. (20 mins)		
How can large predator and human conflicts be managed, using a case study?	Participants will be asked to work in groups of 3 – 4 persons on identifying the strategies that were used in the case study to manage the conflict between people and large predators, and provide reasons why the strategies worked and why they didn't work. (45 mins)	Markers, chalk, flip chart paper	Giving activity instructions and guidelines Summarising group presentations

2.1.5 Session 1.4 – Understanding national laws for protecting species

Topics to be covered: Local and national laws governing wildlife management in Guyana; international conventions and treaties with specific emphasis on the endangered species that are of economic, cultural and social importance.

Duration of session: 3 hours

Resource sheets for lesson:

1.4a Biodiversity and issues relating to the survival of people and species

1.4b The path of regulations being formed from the individual to international organizations

1.4c National Laws for wildlife management and their relationship to international conventions and treaties

1.4d Guyanese NGOs and agencies that advocate species protection

NRAMP 2008

Session plan:

Detailed Content	Student Activity	Materials Required	Teaching techniques
Human activity has affected wildlife populations in a multitude of ways. Threats that presently exist include: loss of wildlife habitat due deforestation and pollution.	Group activity: Participants will work in groups of 3 persons each and will select a wildlife species in the NR and develop a list of current management issues as it relates to this species. Each group will then present their work to the entire group. (20 mins)	Chart paper, markers	Working in groups Presentation skills Explanation of terms and concepts Giving instructions for activities
Amerindian communities have long been known to sustainably use the natural resources around them. Simple observations and conservative measures have almost naturally been put in place to help manage existing wildlife populations. Individual communities may have specific rules/laws with regards to hunting or trapping for example.	Group activity: Each group will develop a list of existing rules made by the community to manage wildlife populations that are important, as well as to develop a list based on the existing rules of what other rules would be needed to be in place for managing the wildlife species. (30 mins)	Chart paper, markers	Working in groups Presentation skills Explanation of terms and concepts Giving instructions for activities

Detailed Content	Student Activity	Materials Required	Teaching techniques
Human threats to wildlife populations have not gone unnoticed. Several international conventions and treaties have been formed with their primary objective being to protect and better manage wildlife management in countries all over the world.	Group Activity: In small groups the conventions of 'specific' species are reviewed pertaining to the particular convention/treaty Guyana is signatory to. Each group will then give a short presentation. (30 mins)	Chart markers Paper.	Working in groups Presentation skills Explanation of terms and concepts Giving instructions for activities
To ensure that the objectives of the conventions/treaties that Guyana is signatory to, several organization/institutions help to ensure that these standards are met by monitoring and enforcing existing laws and management plans.	Review of work of selected local NGOs concerned with species protection; followed by presentation by groups. (30 mins)	Chart markers Paper,	Working in groups Presentation skills Explanation of terms and concepts Giving instructions for activities

2.1.6 Session 1.5 - Understanding local beliefs and practices for management of species

Topics to be covered: Local beliefs and practices for managing wildlife populations; current conflict with the Black Caiman in the North Rupununi

Duration of session: 2 hours

Resource sheets for session:

1.5a The role of traditional management of species populations in the North Rupununi

1.5b Local knowledge of Black Caiman in the North Rupununi

NRAMP 2008

Session plan:

Content	Student Activity	Materials Required	Teaching techniques
The role of traditional management of species population has been extremely important in the management of wildlife in the North Rupununi. With time however, some of these practices have changed, and as such there has been a change in the population structure of animals and plants in the Rupununi.	Participants will work in groups of 3-4 persons to make a list of local beliefs and practices that people in the community used in the past and currently use to manage the Black Caiman and the smaller caimans (20 mins)	Flip chart sheets, markers, coloured chalk	Explanation of terms Working in groups, Presentation skills
	Participants will work together and identify areas where the Black Caiman used to be found and where they are now found (30 mins)	Map of the Rupununi Wetland Core Area	Observing and recalling surrounding environment
	Use PV to document participants experiences with the Black Caiman (40 mins)	Video Camera	Explaining process PV

2.2 Scenario 2 – Overharvesting and exploitation

2.2.1 Session outline

Before commencing the sessions for this scenario, it is important the facilitators review the NRAMP process, and explain that this scenario training is aimed at managing natural resource use and management issues within their villages. This scenario puts a lot of emphasis on monitoring and its role in the decision making process.

2.2.2 Session 2.1 - Reviewing the North Rupununi Adaptive Management Process (NRAMP)

Please refer to the NRAMP 2008 book for examples on using the NRAMP. Facilitators should ensure that participants are aware of the four stages in the NRAMP. Emphasis should be placed on the importance of having factual information when using the NRAMP (30 min).

2.2.3 Session 2.2 Understanding the ecology of biodiversity and the link between livelihoods and biodiversity in the North Rupununi

Topics to be covered: Biodiversity and its ecological and social functions.

Duration of session: 2 hours

Resource sheets for lesson:

2.2. Biodiversity and people
NRAMP 2008

Session plan:

Content	Activity	Materials Required	Teaching techniques
There are many world views on the role that people and their activities have on biodiversity and the surrounding environment. Often times the views of science conflict with the realness of situations where people depend and have depended on the natural environment for their survival for centuries. It is important that the views that are recorded and made public include the voices of everyone, not just that of science but also of the people who live and interact on a day to day basis with the plant and animal life around them.	Participants in two groups of 4 will review Resource 2.2, and discuss their views on the essay as well as their views on the relationship between people and biodiversity.	Flip chart paper, markers	Group discussion and presentation
The North Rupununi has long been known to support a wide	Participants will work in two groups. The following is a pre-allocation of animal groups to the 8 communities. Mammals – Massara- Fishes – Rewa Reptiles - Yupukari Amphibians – Annai Central Birds – Toka, Surama Plants - Rupertee Insects – Surama Each group will discuss the relevance of these species in the	Flip chart paper, markers	Group discussions and presentations

Content	Activity	Materials Required	Teaching techniques
range of wildlife as a result of the existing rich and almost pristine ecosystem habitats.	day to day life of the villagers. Encourage participants to think of the:- relevance of the animal group and individual species in the village and people's day to day activities (uses) what the presence or absence of those species is associated with		

2.2.4 Session 2.3 - Understanding traditional and non-traditional systems for natural resource management

Topics to be covered: What is natural resource management; local examples of natural resource management in the North Rupununi for example the Arapaima Management Plan.

Duration of session: 3 hours

Resource sheets for session:

2.3a Natural resource management and different types of strategies

2.3b Example of resource management in the Rupununi – the Arapaima Plan Fact Sheet
NRAMP 2008

Session plan:

Detailed Content	Activity	Materials Required	Teaching techniques
Preservation and Conservation/ Sustainable Use	<p>1.Sustainable Fishing – Participants will be divided into groups of four to five persons. Each group will be representing a community and will using a waterbody for fishing. The waterbody will be named after a water body found in the area. Each person in the group will be representing 1 family found in a village. Each waterbody will initially have eight fishes. Each family will be asked to proceed fishing, but there must be no forms of communication between families. After the first fishing session, facilitators will add two more fishes for each fish that remains in the waterbody. The families will fish again, without any forms of communication between families. At the end of the second round of fishing, facilitators will once again add two more fishes for each remaining fish. Each community of families will then be asked to count the number of fishes in their respective ponds. Facilitators will ask the communities to reflect on the activity.</p> <p>The activity will be repeated, but this time there communication is encouraged between families in each community. There will be two rounds of fishing once again with facilitators adding two fishes for each fish that remains after each round of fishing.</p> <p>At the end of the activity – participants will reflect on the differences in the two activities. Concepts of communication, development of plans for resource use and management that</p>	Mints (as fish), cardboard tags for the names of the waterbodies	Group discussion Reflection

Detailed Content	Activity	Materials Required	Teaching techniques
Resource Management in the North Rupununi	includes everyone so that everyone benefits should be part of the reflection process.		
	<p>Exploring the Arapaima Management Plan:- In groups of four persons each, participants will review the Arapaima Management Plan, focusing on why it was developed, how it was developed and how it will be implemented. Any comments or ideas from these discussions that can be useful to the implementation of the Arapaima Management Plan within the Rupununi will be forwarded to the NRDDDB.</p> <p>2.Developing a poster on traditional management methods:- Participants in groups of four – five persons will develop a simple poster of traditional methods used for management of natural resources within the North Rupununi. Participants will use the rich picture method as the tool for developing their poster.</p>	<p>Resource: Arapaima Fact Sheet Flip Chart Markers</p> <p>Cardboard or flip chart paper, markers</p>	<p>Group discussion</p> <p>Presentation</p> <p>Group Discussion</p> <p>Techniques for recording ideas</p>

2.2.5 Session 2.4 - Understanding how to do monitoring and to link the information from monitoring to decision making

Topics to be covered: What is monitoring; what are the steps or stages in monitoring; where monitoring fits into the decision making process; how to develop and implement a monitoring programme for natural resources.

Duration of session: 8 hours

Resource sheets for session:

2.4a Monitoring and its role in natural resource management

2.4b How to do monitoring for decision making

2.4c Indicators and their role in monitoring

2.4d Data analysis and presentation

NRAMP 2008

North Rupununi Monitoring Manual (2006)

Session plan:

Content	Activity	Materials Required	Teaching techniques
The key characteristics of monitoring and how to establish a monitoring strategy	<p>1. Participants in groups of four – five will create a poster for display on the traditional and current methods of resource extraction and how they were and are used for community based natural resource management</p> <p>2. Participants will in groups of four to five persons develop a monitoring programme for monitoring food fish consumption in the village according the rainy season and the dry season. Each group will present their monitoring programme to the entire group. Based on the monitoring programmes developed, one consolidated programme will be agreed upon by both groups for trial implementation in the village.</p> <p>Using NRAMP and the features of NRAMP to guide the development of the monitoring programme.</p> <p>a. Using SWOT Analysis, participants will go through the strengths, weaknesses, opportunities and threats that can be associated with monitoring fish consumption within the village during the dry and wet season.</p> <p>b. Participants will then define their goal for monitoring fish consumption within the village.</p> <p>c. Using the log frame as the tool, participants will then develop their monitoring programme for fish consumption within the village. The log frame must include, the outputs, the activities, the when, the where and who, the resources that would be needed, the indicators, and the assumptions associated with achieving the output.</p>	<p>Cardboard, markers</p> <p>Flip Chart Markers</p>	<p>Group Work Presentation Presentation</p> <p>Group Work</p> <p>Evaluation</p> <p>Presentation</p>

2.3 Scenario 3 - Food and water security

2.3.1 Session outline

Earth keeps a wide variety of animals and plants in an interconnected web of life. The energy and nutrients that we depend on come from the sun, water, air and land which provide us with food and water. If left alone, nature in itself would be able to support itself forever. People are an important part of this system. However, in pursuit of enhancing our standard of living, we sometimes take too much and damage the Earth in doing so. This has a domino effect in that we also impact on our access to food and water.

Upon commencement of this scenario training, it should be explained that is focused on equipping community members with the skills and information necessary to develop plans using the NRAMP, to manage situations that may affect or impact the availability of food and or water.

2.3.2 Session 3.1 - Reviewing the North Rupununi Adaptive Management Process (NRAMP)

Please refer to the NRAMP 2008 book for examples on using the NRAMP. Facilitators should ensure that participants are aware of the four stages in the NRAMP. Emphasis should be placed on the importance of having factual information when using the NRAMP (30 min).

Facilitators will review the NRAMP process with participants using the simple example of using NRAMP to provide food for a family for one month presented in Resource sheet 3.1.

2.3.3 Session 3.2 - Understanding the water cycle and levels of flooding in the North Rupununi

Topics to be covered: What is the water cycle; what are the processes responsible for the continuity of the water cycle; what are the effects of the water cycle on water retention on the earth's surface and flooding.

Duration of session: 2.5 hours

Resource sheets for session:

3.2a What is the water cycle?

3.2b Climate and weather

3.2c Map of the North Rupununi showing potential flooding levels

3.2d Different types of soils and their characteristics

3.2e Datasheets for raindrop activity

Session plan:

Content	Activity	Materials Required	Teaching techniques
Precipitation in the form of rain, falling on the Earth's surface, collects and stays at different locations for different amounts of time. These activities	Upon reviewing the water cycle, participants will be asked to think of and list all the places that water, after falling back onto the Earth as precipitation can possibly go. When the list is completed the facilitators will encourage participants to group the identified places into the	Coloured crayons, flip chart paper, markers	Review Group work

Content	Activity	Materials Required	Teaching techniques
<p>are aimed at helping participants grasp the concept that the water cycle is dependent on the location and intensity of precipitation, in this case, rain.</p>	<p>following categories; SOIL, PLANTS & ANIMALS, RIVERS & OCEANS, PONDS & LAKES, GROUNDWATER. Participants will then be divided into five groups. Each group will be assigned one of the five categories, and will be required to draw the particular topic as it occurs in the Rupununi and the way in which water gets into that location.</p> <p>Upon completion of this activity, the facilitators will then ask the participants to use each picture as if it is part of a puzzle, and arrange them to make a water cycle.</p> <p>TIME – 30 minutes</p> <p>This activity will use the water cycle developed in the previous activity. Facilitators will explain that participants represent rain drops. Participants will be divided into groups of five persons each. Each rain drop / participant will record its path on a prepared data sheet. The path of the rain drop will be determined using a dice, with the names of locations on it. Before starting the activity, participants will be asked to predict where the most rain drops will fall as a group. Facilitators will collect each group's response.</p> <p>For example – Group 1 starts at 'River'; they mark this by placing a mark on their data sheet. When the group shakes the dice, they will move to the next location depending on where the dice lands. Again they will make a mark on their datasheet to represent this stop. If the dice lands on the option marked ' Rain Stays', participants will make a mark to represent this stop at the location, and go to the back of the line, if there is/are other group/s at the location.</p> <p>Facilitators will allow this to continue for 20 – 30 minutes, depending on the initial understanding of the participants of the activity. Facilitators will emphasize the importance of recording each stop and movement of the rain drops/participants.</p> <p>TIME: 30 – 40 mins</p>	<p>5 dice labelled according to the following categories; rivers and oceans, lakes and ponds, plants and animals, groundwater, soil Datasheet for each participant</p>	<p>Critical thinking Group work</p>

Content	Activity	Materials Required	Teaching techniques
	<p>Participants will total the number of raindrops at each location for each member of the group. Facilitators will provide the datasheet for the compilation of this data. Each group will then present their totals to all participants. Facilitators will provide the combined sum of raindrops at each location for all participants/rain drops after each group presents their total for each location. Facilitators will then compare the results that were recorded on the number of raindrops at each location to those that the participants had predicted before beginning the activity.</p> <p>At this stage, facilitators will encourage participants to discuss what could be some of the consequences of the different amounts of rainfall at the different locations on the environment and people's livelihoods.</p> <p>TIME: 20 – 30 mins</p>	Group datasheet	<p>Group work</p> <p>Data analysis</p> <p>Discussion</p>

2.3.4 Session 3.3 - Understanding water quality and guidelines for monitoring water quality

Topics to be covered: What is water quality; what are the components of water quality monitoring; what are methods that can be used in water quality monitoring; how to identify suitable indicators for assessing good water quality.

Duration of session: 1 hour

Resource sheets for session:

3.3 Monitoring of water attributes

NRAMP 2008

North Rupununi Monitoring Manual (2006)

Session plan:

Content	Activity	Materials Required	Teaching techniques
Water is important in our daily lives. We need it to survive. However, sometimes not all water is appropriate or good for use. Over time, man has developed or decided on signs that that would indicate whether water is good for use	Facilitators will review indicators and their role in providing information for making decisions (20 mins) Participants will identify two waterbodies within their village's use area. One of the selected water bodies must be used by villagers for consumption while the other should be one that is not used. Facilitators will encourage participants to list what features or occurrences indicate or signal to their community members that the water from the waterbody is good or safe to use. Upon completing and presenting this list, participants will then discuss reasons why the water in the waterbody is not safe for use, and methods can be used to make it safe to use (40 mins)	Blackboard, chalk Flip chart paper, markers	Recall Review Questioning Group work Discussion Critical review

2.3.5 Session 3.4 - Resolving conflicts over land and water resources in the North Rupununi

Topics to be covered: Traditional natural resource management; current natural resource management; conflict resolution.

Duration of session: 3 hours

Resource sheets for session:
NRAMP 2008

Session plan:

Content	Activity	Materials Required	Teaching techniques
Resolving conflicts between different ways of managing land and water resources	<p>The following is a summary of the use of a waterbody by members of two villages. There are 16 households in Village A with a population of 100 members, and Village B has 19 households with 122 members. The waterbody is located approximately 800 metres from the centre of Village A and 5 km from Village B. The waterbody is surrounded by high forests, as well as Kokerite palms.</p> <p>Villagers from Village A use the water from the pond during the dry season, as well as they use fishes from the pond. The village also has a community tourism initiative, of which the pond is an important part of. Tourists are usually taken to the pond to see the many different types of birds that can be found there, as well as Giant Otters, Giant River Turtles, Arapaima and the giant Victoria Lily.</p> <p>Villagers from Village B do not use the pond for water; however they do go fishing in the pond.</p> <p>Villagers from both Village A and B gather leaves from the Kokerite trees close to the pond.</p> <p>There is water in the pond throughout the year. During the rainy season, the banks overflow onto the surrounding forests and the pond is used as a shortcut between villages.</p> <p>Recently Village B has started to intensively cut trees from the area surrounding the pond. This has created some tensions between villages as Village</p>	Flip chart paper, markers, blackboard, chalk	<p>Group work</p> <p>Discussion</p> <p>Role-playing</p>

Content	Activity	Materials Required	Teaching techniques
	<p>A uses the pond as a tourism destination, as well as for water for drinking and cooking, and they have found that because of the noise of the tree cutting equipment that the animals have become shy. This is affecting their ability to meet the needs of their tourists. Another concern is that the debris is causing the water to become unsuitable for drinking. Village B has signed a contract to provide a company with 10 logs each 11 meters long per week for 10 weeks.</p> <p>The village councils of the two villages have agreed to talk and find a way of resolving the conflict in use of the waterbody and the surrounding area.</p> <p>Participants will be divided into two groups – one representing Village A and the other Village B. Using the steps of NRAMP, each group will develop their proposed plan for resolving this conflict between communities. After developing their plans, the groups will engage each other in a process of discussion about their respective plans of action, to meet at a common ground where both villages are satisfied.</p> <p>TIME: 6 hours</p>		

2.3.6 Session 3.5 - Developing plans for food security in the North Rupununi

Topics to be covered: NRAMP; village food security.

Duration of session: 3 hours

Resource sheets for session:
NRAMP 2008

Session plan:

Participants will be asked to develop a plan for ensuring that the villagers have food during the rainy season when difficulty is usually experienced by villagers to get food.

2.4 Scenario 4 – Ownership

2.4.1 Session outline

This scenario is aimed at providing community members with a basic understanding of laws and regulations that are applicable to their use of communal lands by members of the community. Additionally, it is also aimed at assisting community members with the knowledge that is required to manage situations of use of their land by non-residents and outsiders.

2.4.2 Session 4.1 - Reviewing the North Rupununi Adaptive Management Process (NRAMP)

Please refer to the NRAMP 2008 book for examples on using the NRAMP. Facilitators should ensure that participants are aware of the four stages in the NRAMP (30 min).

2.4.3 Session 4.2 - Understanding laws and regulations for natural resource management

Topics to be covered: What are laws?; how are laws developed?; what are the responsibilities of the village council?; what does the Amerindian Act include?; what does the Forestry Commission and Forestry Act include with regards to Amerindians and Amerindian lands?; what does the Mining Act include with regards to Amerindians and Amerindian lands?; what does the Fisheries act include?; what does the Wildlife and Environmental Act include?

Duration of session: 8 hours

Resource sheets for sessions:

4.2 The Amerindian Act - village councils and rules
NRAMP 2008

Session plan:

Content	Activity	Materials Required	Teaching techniques
The development of laws	Participants will carry this activity as one group. The group will be given 13 strips of paper or cardboard with a number of sentences (see Activity 1 additional notes below). Each of these sentences represents a stage in the process by which laws are conceived, developed and implemented. Participants will be asked arrange these cards or strips of paper in the order in which they perceive is the process by which laws are developed and implemented in the country. This activity is aimed at allowing participants to understand the process by which laws are made, and puts it in a context in which it is understood that laws do not come out of thin air, but rather are based on the needs and	Blackboard, chalk Flip chart paper, markers Sentence cards	Group work Discussion

Content	Activity	Materials Required	Teaching techniques
Understanding the roles of the village council	<p>concerns of citizens. Time: 1 hour</p> <p>Participants will be divided in two groups. They will be given a scenario which they will have to manage as a village council (see Activity 2 additional notes below). They will develop strategies for managing their respective situations, and then present those to the entire group. Time: 2 hour</p>		<p>Group work</p> <p>Discussion</p>
The Amerindian Act	<p>Participants will again be divided into two groups, preferably the same groups. Each group will be given another scenario which they have to answer based on the Amerindian Act 2006 (see Activity 3 additional notes below). Time: 2 hour</p>		<p>Group work</p> <p>Discussion</p>
Understanding laws in different situations	<p>In their groups participants will review and develop a strategy for managing two scenarios (see Activity 4 additional notes below), and will then present this to the entire group. Time: 2 hours</p>		<p>Group work</p> <p>Discussion</p>
Recap session on laws	<p>Facilitators will divide participants into 2 groups and repeat Activity 1 as a competition. Each group will be given five minutes to accurately arrange the cards. The group that arranges the cards or most of the cards in the correct order will win the competition. After each group has a turn, facilitators will then review the process with participants. Time: 30 min</p>		<p>Group work</p> <p>Discussion</p>
Quiz on laws	<p>In the same groups, participants will complete a true and false quiz (see Activity 6 additional notes below). Participants will place a 'T' or 'F' indicating whether the statements are accurate or false. Time: 30 min</p>		<p>Group work</p> <p>Discussion</p>

Additional notes:

Activity One – The development of laws

Facilitators would need to prepare the 13 strips of paper or cardboard beforehand. The order in which they must be arranged are as follows:-

Citizens' interests, needs and concerns

Concern, interests brought to the attention of Government by citizens, groups, and organizations with interest in the situation.

Government agencies develops strategies for managing citizens' interest needs and concerns

Citizens' interests, needs, and concerns and management of these discussed at Cabinet level

Decision made on whether a law is necessary to protect the rights of the population, and the way in which decisions are made related to the particular issue being addressed.

Laws are drafted

Debate on the law that is drafted by Cabinet members who represent their respective groups/supporters

Public consultation of the laws

Laws are finalized, with responsibilities included for its implementation and enforcement

Laws becomes enacted and approved by Cabinet at Parliament- President signs approval of the law

Public awareness and education of the laws being enacted

Laws are implemented and enforced commencing from a specified date

In instances when laws are broken penalties and fines are imposed

Facilitators will mix the sheets up and give the participants 10-15 minutes to complete arranging the cards correctly in a line. After this, facilitators will check, and for ever card that is in the correct numerical position, facilitators will place a small object indicating its accuracy. For the cards that are not in the correct position, facilitators will indicate this, and give the group another 5 minutes to make the arrangement correct. After the 5 minutes facilitators will then check and again place objects to indicate accuracy. Facilitators will then arrange the cards accurately if it has not been done by the participants, explaining the process while doing so.

Activity Two - Roles and responsibilities of the village council

Scenario A:

An outsider has asked and received permission from the village to temporarily rent a house in the village. The village has stipulated in its agreement, that this person should follow the rules of the village. This person has lived in the village for 3 years, and has always kept within the rules of the village.

In the fourth year, the person starts to sell cigarettes and rum and beer. However, the village has a rule that strictly prohibits the sale of these items in the village. When village rules are broken, the offender has to pay a fine of \$5000.00 to the village council. However, this person cannot afford to pay this.

1. What process and actions can the village council use to resolve this issue in keeping with the law.
2. The numbers of persons in the group represents the number of village councillors in the community. Based on this each group has to give what the range of the village population is based on the number of elected councillors.

Scenario B:

A forest operation has its operations 2 miles from the boundary of a villages' demarcated land. A community member made an observation of employees from the forest operation, going into the village lands and hunting with a rifle. The village council responded to this report by approaching the

forest operation manager with this issue. The forest manager told the village council that they are hunting in the area, and they would continue to do so.

1. What process and actions can the village council use to manage this situation in accordance with the law?
2. The numbers of persons in the group represents the number of village councillors in the community. Based on this each group has to give what the range of the village population is based on the number of elected councillors.

Note to facilitators:

Scenario A has an inaccuracy with regards to the fine that can be imposed when rules that are made by the village council are broken. Facilitators should not mention this to participants during the activity. In the presentation of the results, facilitators should encourage discussion to bring this about, if it has not already been identified by the group.

Activity Three – The Amerindian Act

Scenario A:

A village has a population of 360 persons. The village is scheduled to have village council elections.

1. How many councillors can the village have as the maximum number of councillors?
2. How many councillors can the village have as the minimum number of councillors?

Scenario B:

A village has 1250 persons in the central part of the village. There are two satellite communities that are also a part of the village. They each have 915 and 75 residents respectively. The village is scheduled to have village council elections.

1. How many councillors can the village have as the maximum number of councillors?
2. How many councillors can the village have as the minimum number of councillors?

Activity Four – Understanding laws in different situations

Scenario A:

A member of an Amerindian village came across a group of miners, mining in community lands. He became very angry because he did not know anything about this, and he thought that it was because the village council did not inform the village. He approached a councillor and very angrily asked why it is that they gave permission for mining in the village lands and did not consult the entire village. The village councillor did not have any knowledge of these mining activities in the village lands. The village council arranged a visit to the place identifies by the villager, and they did in fact find miners mining for gold in the area.

1. What steps can the village council take in this situation?

Scenario B:

A community member sought and received permission from the village council to harvest Kokerite leaves for thatching his house from community lands. He requested permission to harvest 1000 leaves, which he harvested. However, subsequent to this he proceeded to harvest an additional 1500 leaves which he sold to a businessman from a nearby village.

1. What are the steps that the village council can take in accordance with the law to manage this situation?

Activity Six - Quiz

Questions:

1. The Amerindian Act can be cited as the Amerindian Act 2003.
2. The NRAMP has four stages or steps.
3. A person wishing to conduct scientific research within an Amerindian community does not have to get permission.

4. The Guyana Forestry Commission Act was enacted in the Parliament of Guyana on the 18th January 1970.
5. The Guyana Forestry Commission has a responsibility to assist in the prevention and control of forest fires.
6. The Forest Act was enacted by Parliament on the 2nd May 1953.
7. According to the Mining Act, all minerals of Guyana shall not vest (legally have power over) in the state.
8. Persons shall fish in fisheries waters without a valid commercial fishers' license.
9. The environmental and wildlife regulations seek to provide protection of particular species of prescribed plants and animals.
10. Exotic wildlife or exotic species means any species that is native to Guyana.
11. In the NRAMP process – to evaluate is to keep checking on what is happening.
12. An indicator is a sign that can be measured to understand what is happening.
13. Any person from any part of the country can sell or offer to sell wildlife without a license.
14. A village of less than 600 residents can have 15 village councillors.
15. A village council may not assign tasks, but can delegate its functions to any other person.

ANSWERS:1.F 2.T 3.F 4.F 5. T 6. T 7.F 8.F 9. T 10. F 11. F 12. T 13. F 14. F.15. F

2.5 Scenario 5 - Livelihood enterprise development

2.5.1 Session outline

This scenario is aimed at assisting communities in the development of the plans for managing community business initiatives using the NRAMP. The step by step process of the NRAMP is applicable to understanding, developing and managing a community business initiative.

Most businesses after being developed usually fail after the first 2 years, if there is not a definite and solid plan. In the process of planning and managing a business, communities should always be objective, critical and focused on their business and what it is that they would like to achieve.

Objective – meaning that they should have an open mind for changes and developments based on what the current situation is. For example, if there is no market for a particular product, businesses should be able to make a decision to change their focus to meet the current markets, if their goal is to make a profit.

Critical – this is especially important in running a business. Business should be constantly evaluating them to realize any potential strengths and weaknesses. It is only human to want to acknowledge the good things, but the difference between success and failure comes in businesses not taking stock of potential weaknesses, especially if other businesses and competitors know those weaknesses.

Focused – being focused is of prime importance. Businesses usually start very vibrantly, and then the energy goes down. Businesses should stay keen on achieving the goals (both long and short term) that they have set for themselves.

2.5.2 Session 5.1 - Reviewing the North Rupununi Adaptive Management Process (NRAMP)

Please refer to the NRAMP 2008 book for examples on using the NRAMP. Facilitators should ensure that participants are aware of the four stages in the NRAMP (30 min).

2.5.3 Session 5.2 - Livelihood activities and business planning in the North Rupununi

Topics to be covered: Current and historical livelihoods in the North Rupununi; steps in business planning; using a log frame for developing a business plan.

Duration of session: 8 hours

Resource sheets for sessions:

5.2 Tourism initiatives in the North Rupununi
NRAMP 2008

Session plan:

Content	Activity	Materials Required	Teaching techniques
Using NRAMP to evaluate and plan businesses	Participants will be divided into two equal groups and will be asked to use the NRAMP to develop a strategy for successfully managing one of the two described businesses (see Activity 1 additional notes below). Time: 8 hours	Blackboard, chalk Flip chart paper, markers	Group work Discussion

Activity One – Using NRAMP to evaluate businesses

Facilitators will encourage participants to first OBSERVE the facts of their business and record those. Upon completing the OBSERVATION phase, participants will then be asked to define or state what their goals are for managing and implementing their business. In EVALUATION phase, facilitators should emphasize that this should include the strong and weak points of the current business situation that will promote or destroy the business. In EVALUATING, facilitators will encourage participants to answer the following questions:

What are the main constraints (negatives) and opportunities (positives) in achieving the vision given the starting conditions (current situation)?

What are the current capacities (strengths), and weaknesses that would allow /deny reaching the vision?

What external activities/events/situations affect and have the potential to affect the vision from being reached?

After EVALUATION, participants will use the LOG FRAME, to develop their plan that will enable the business to overcome the weaknesses and to take advantage of the strengths of their current situation. In PLANNING TO ACT, participants should also identify indicators that they will monitor that will indicate the business's progress.

Business Description A:

Type of business – Nature tourism

History of village – 30 years since people have been living there; used to be farming grounds.

Village Description – riverine community that is from central location in the Rupununi by land during the dry season (1 hour), by boat (3 hours), by boat during the rainy season (2-2.5 hours), there is an old airstrip (1 hour, 5 mins from Georgetown to village).

Number of villagers – 300

Livelihood activities in the village – farming, fishing, hunting, brick making and handicraft.

Village council – 10 persons

Community make up – Mostly Makushi with few Wapishana

Environment and wildlife – High forests, white sand savanna, endangered animals (Giant Otter, Black Caiman, Jaguar, Harpy Eagle, Giant River Turtle)

Village personnel and resources – Tourist Benab and accommodation for 15 persons at a time, trained guides and trained cooks and food handlers.

Business Description B:

Type of business – Handicraft

History of village – 80 years, centrally located in relation other villages in the region

Village Description – 1 mile from main highway, surrounded by savanna, and white sands.

Number of villagers – 800

Livelihood activities – farming, fishing, hunting handicraft, shop owners, handiwork for businesses in area.

Village Council – 12 councillors

Environment and natural resources – Nibbi, Mukuru, Cotton, Coloured seeds, Kokerite and Ite Palms

Village personnel and resources – Elders with the knowledge to make high quality handicraft products, such as matapee, fans, sifters, bow and arrow, cotton hammocks and garments, jewellery from natural products, village has a map showing where different natural products can be found and in what quantity.

3. Resource sheets

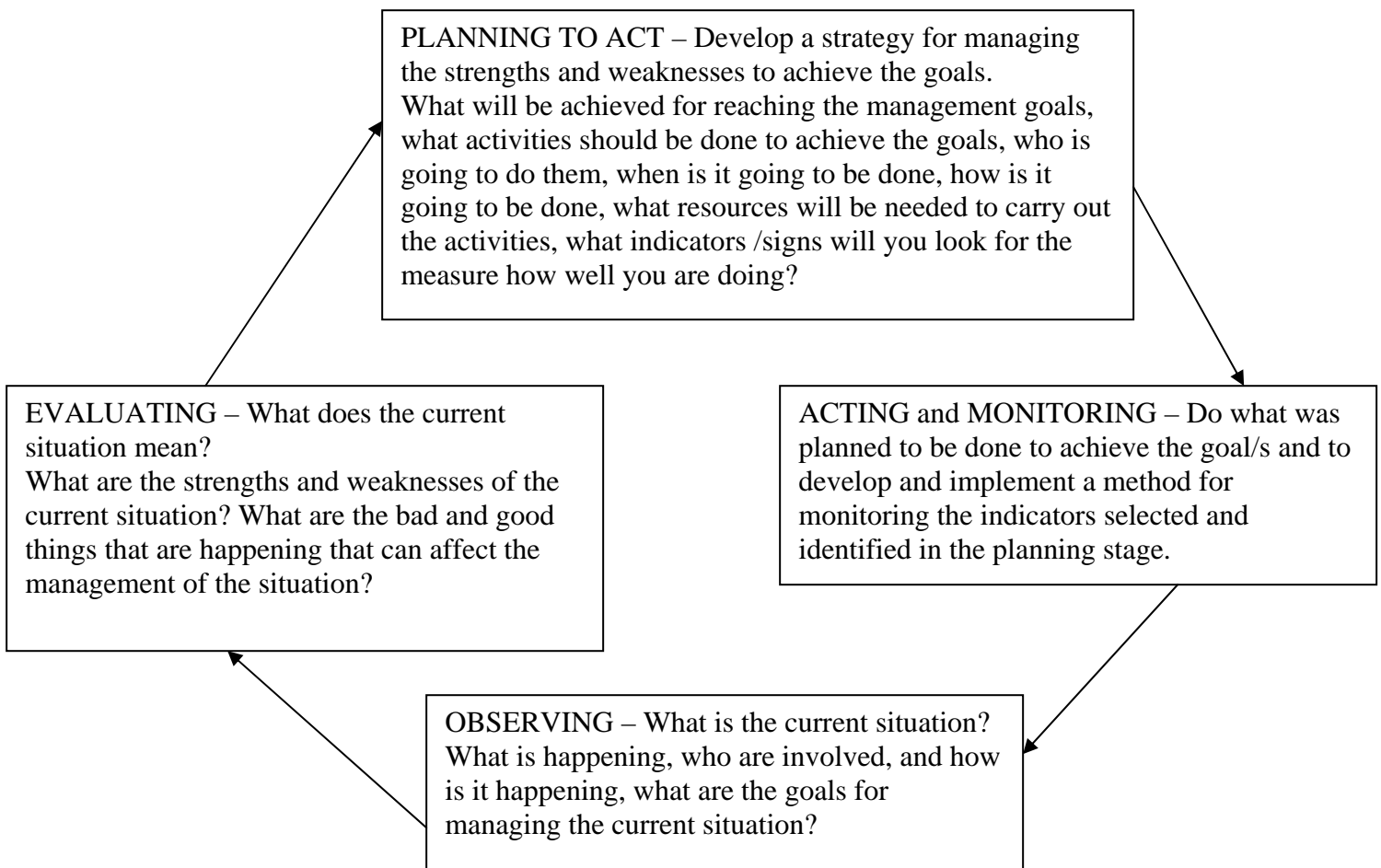
The following pages provide the different resource sheets for the Community Course.

Resource sheet 1.1 What is the learning cycle approach in the NRAMP?

The NRAMP process can be defined by five terms: adaptive; participative; holistic; evidence based; and practical.

- Adaptive – allowing the plan to change according to the situation.
- Participative - working together.
- Holistic - having everything connected: people, natural resource, and institution.
- Practical - realistic (something real) doing things with the resources that are available.
- Evidence based - proof of what the situation really is i.e. documented.

The four stages of the NRAMP shown in the diagram below are: 1. Observing; 2. Evaluating; 3. Planning To Act; and 4. Acting and Monitoring. Please refer to the NRAMP 2008 for additional details and examples of the learning cycle.



The NRAMP is a cycle that can be repeated as many times as needed to continually manage the situation at hand.

Activity:

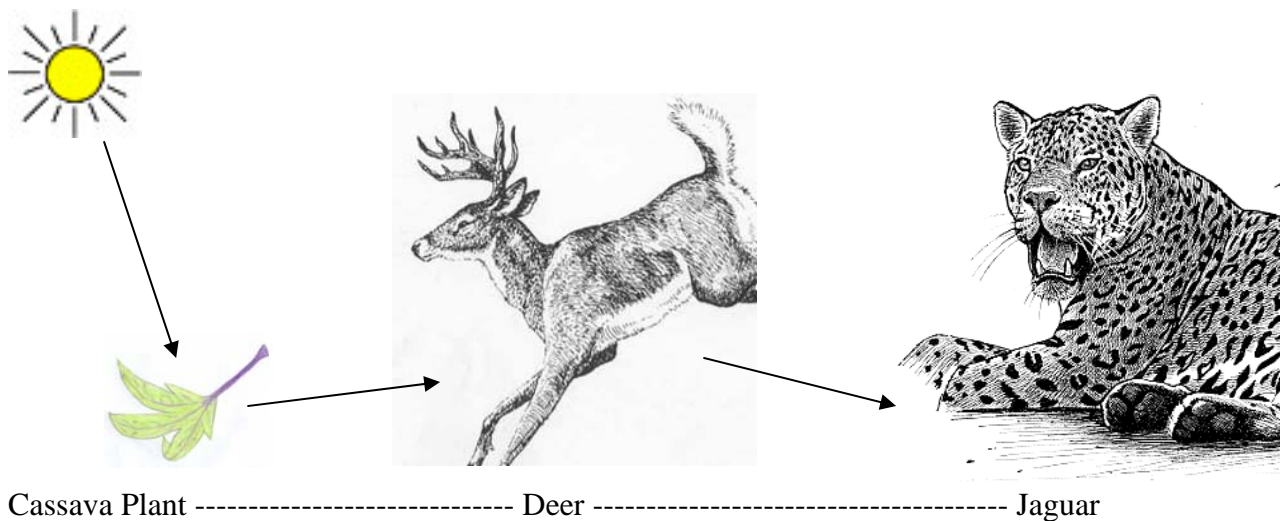
Scenario - A man received news that his farm was being attacked by peccaries. He left home at 3:30 pm. His farm is 6 miles away from where he lives. He usually takes 3 hours to get to his farm. When he received the news, he had just returned from cutting logs, and had not eaten for the day.

He left home in such a rush that he left his torch, and did not eat anything. While he was just past the half way mark between his home and farm he started to become very dizzy with hunger. He had also forgotten his torch home, and he needed to get to his farm before night completely surrounded him. He noticed there was a tree with some fruits; however, he had never seen nor eaten that fruit before. His goal is to get to the farm before night. Using the NRAMP, how would this man manage this situation?

Resource sheet 1.2 What is a food chain?

A food chain is a set order of plants and animals that depend on each other for food energy. Within this order, energy is passed from populations at one level to populations at the next higher level. This flow of energy is a one way flow. These levels within the food chain are known as trophic levels.

The diagram below shows a simple food chain that happens in the Rupununi.



Food chains usually comprise of the following trophic levels:-

A producer is usually a green plant that makes its own food using the process of photosynthesis which requires sunlight, water, chlorophyll and carbon dioxide from the air.

Consumers are all the organisms that can not make their own food (and need producers for food). In ecosystems, consumers obtain food by eating other organisms. There are different levels of consumers. Those that feed directly from producers, i.e. organisms that eat plant or plant products - these are called primary consumers. Organisms that feed on primary consumers are called secondary consumers. Those who feed on secondary consumers are tertiary consumers.

Decomposers – These are mainly bacteria and fungi that change dead matter into gases such as carbon and nitrogen to be released back into the air, soil, or water. Without decomposers, the earth would be covered with dead organisms. Decomposers are necessary since they recycle the nutrients to be used again by producers.

Most food chains are interconnected. Animals typically have a varied diet and, in turn, serve as food for a variety of other creatures that prey on them. These interconnections create food webs.

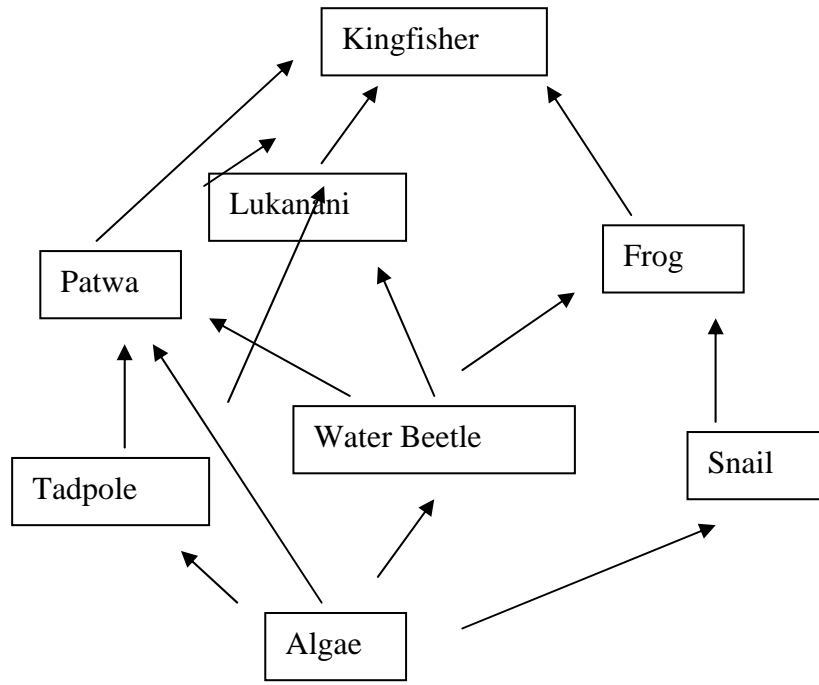


Diagram of a food web in the Rupununi

At each trophic level along a food chain, there is always a 'loss' of matter and energy in the forms of waste (e.g. carbon dioxide, faeces), and heat. Up to 90% of matter and energy can be 'lost' at each level.

Definitions of terms

Photosynthesis – This is the process by which plants, and some bacteria, from sunlight to produce sugar, which is then changed to energy that is used by all living things.

Chlorophyll – This is the part of the plant that gives plants their green color. Chlorophyll absorbs the sunlight and turns the energy from the sun into usable energy.

Herbivores – These organisms eat only plants or plant products. Examples are grasshoppers, mice, deer, cows, sheep, and goats. Can you think of any others?

Carnivores – These organisms are those that eat only other animals. Examples are foxes, frogs, snakes, hawks, jaguar, and spiders. Can you think of any others?

Omnivores – These organisms eat both plants and animals. Examples are turtles, monkeys, and people. Can you think of any others?

Trophic levels – This refers to the different levels or steps in the food chain.

Activity

On a piece of paper, draw a food web of your own – a food web you have seen in the Rupununi. Ensure that arrows from one organism to the other are used to show the relationship between organisms.

Resource sheet 1.3a What are predators and prey?

Predation

Predation is a type of relationship between populations of different species. Predation can be defined as one living organism feeding on another. Predation at the level of one prey individual is always harmful, however at the level of a population, within limits can to the advantage of the population.

What is a predator?

A predator is any organism that feeds on another. Predators are at the consumer level in the food chain. Examples of predators in the Rupununi include: - the Agouti feeds on Cassava, the Puma feeds on Deer.

Adaptations of predators

Organisms that are predators have developed strategies for ensuring that the maximum quantity of food is acquired using the least energy possible. Predators continuously improve their techniques for hunting and gathering food. Individual predators that are weak, slow, and do not react quickly to prey do not usually survive for very long. Over time predators have acquired characteristics that increase their hunting ability and success. These include sharp beaks and teeth, talons, and claws that allow them to seize, contain, kill and feed on their prey. Predators have also developed characteristics that increase their hunting efficiency. These include colouration that allows them to blend into the environment – CAMOUFLAGE. Some animals also use COUNTER SHADING as a mean of blending in with the environment. In this technique the colour on the animal is darker above than below e.g. some large predators also have coloured lines and circles to improve on visibility in different light intensities.

What is a prey?

A prey is an organism that is hunted, killed and eaten for food by another organism. Prey organisms are usually producers (plants) and primary consumers (herbivores and omnivores).

Adaptations of prey

Over time, prey organisms have developed strategies for escaping predation. Animals that are most often preyed upon have several different ways in which they avoid being eaten. These include:

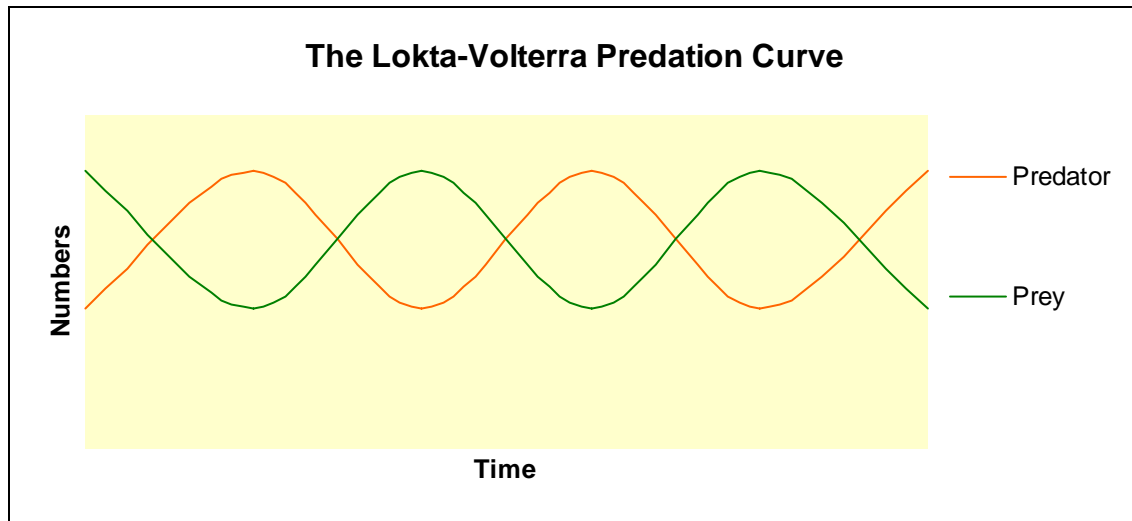
- 1) Escape - If an animal knows that it is about to be attacked, it will try to escape by running away as fast as it can. Animals can use speed as a very efficient method of escaping predators.
- 2) Protective colouration – Some animals that are usually preyed upon have adapted protective colouration as a means of escaping predators by blending in with the surrounding environment. These forms of camouflage include cryptic colouration (where the colour of the organism is similar to the colour of something in the environment), disruptive colouration (lines and marks break up the outline of the animal or draws attention to a specific part of the body).
- 3) Chemical and physical defence – Some organisms avoid predation by producing secretions or odours that are repulsive and/or dangerous to predators. Some organisms also have structures that allow for protection from predators, for example some plants have thorns to prevent animals from eating their stems and leaves and some animals have spines that are used to ward off predators.
- 4) Mimicry – Some prey organisms use the appearance and behaviour of other organisms that have special methods of defence against to protect themselves from attacks, as the predator would associate the mimicked appearance with a bad taste, smell or physical pain.

Local examples of predator and prey

Jaguar (*Panthera onca*) (predator) –white lipped Peccary (*Tayassu pecari*) (prey)

Arapaima (*Arapaima gigas*) (predator) – Lukanani (*Cichla ocellaris*) (prey)
 Man (*Homo sapiens*) (predator) – Tapir (*Tapirus terrestris*) (prey)
 Black Caiman (*Melanosuchus niger*) (predator) – Arawana (*Osteoglossum bichirrossum*) (prey)
 Harpy Eagle (*Harpia harpyja*) (predator) – Three toed Sloth (*Bradypus tridactylus*) (prey)
 Rattle Snake (*Crotalus durissus*) (predator) – Frog (*Leptodactylus mystaceus*) (prey)
 Anteater (*Myrmecophaga tridactylus*) (predator) – Ant (prey)
 Giant otter (*Pteronura brasiliensis*) (predator) – red Perai (*Pygocentrus nattereri*) (prey)

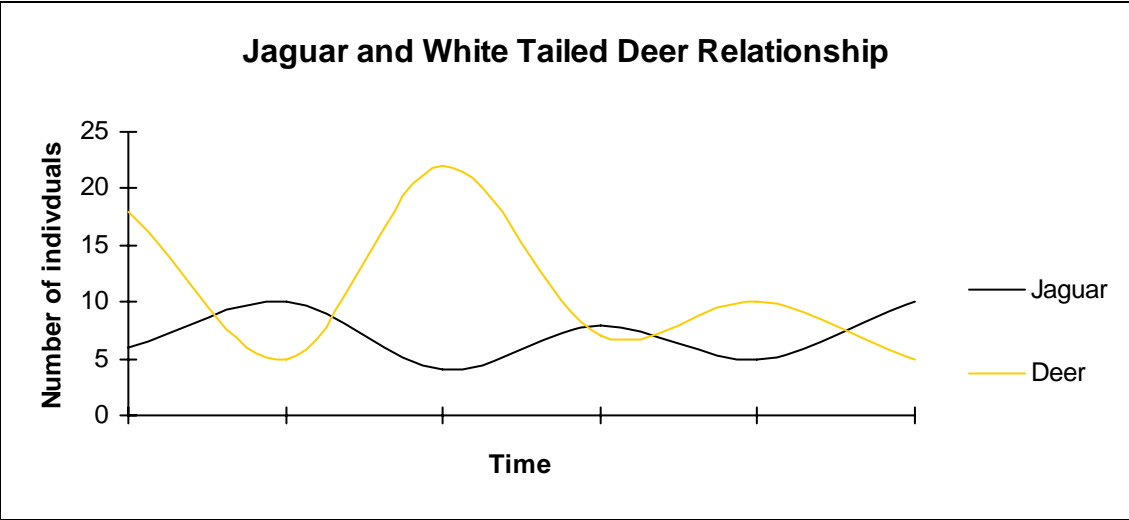
Relationship between predator and prey



The relationship between predator and prey was examined by two persons, Lotka and Volterra. The theory that they put forward is represented in the figure above. This relationship that was defined by Lotka and Volterra, states that as the number of predators increase, the number of prey will decline. As the prey population continues to decrease further, the predator population in turn experiences a decline as food becomes limited.

When the predator population experiences this decline, there is an increase in the prey population, which in turn allows the predator population to increase again as food becomes readily available. Prey populations increase the fastest when both populations of predators and prey are at the lowest, while predator populations increase the fastest when the populations of prey are high.

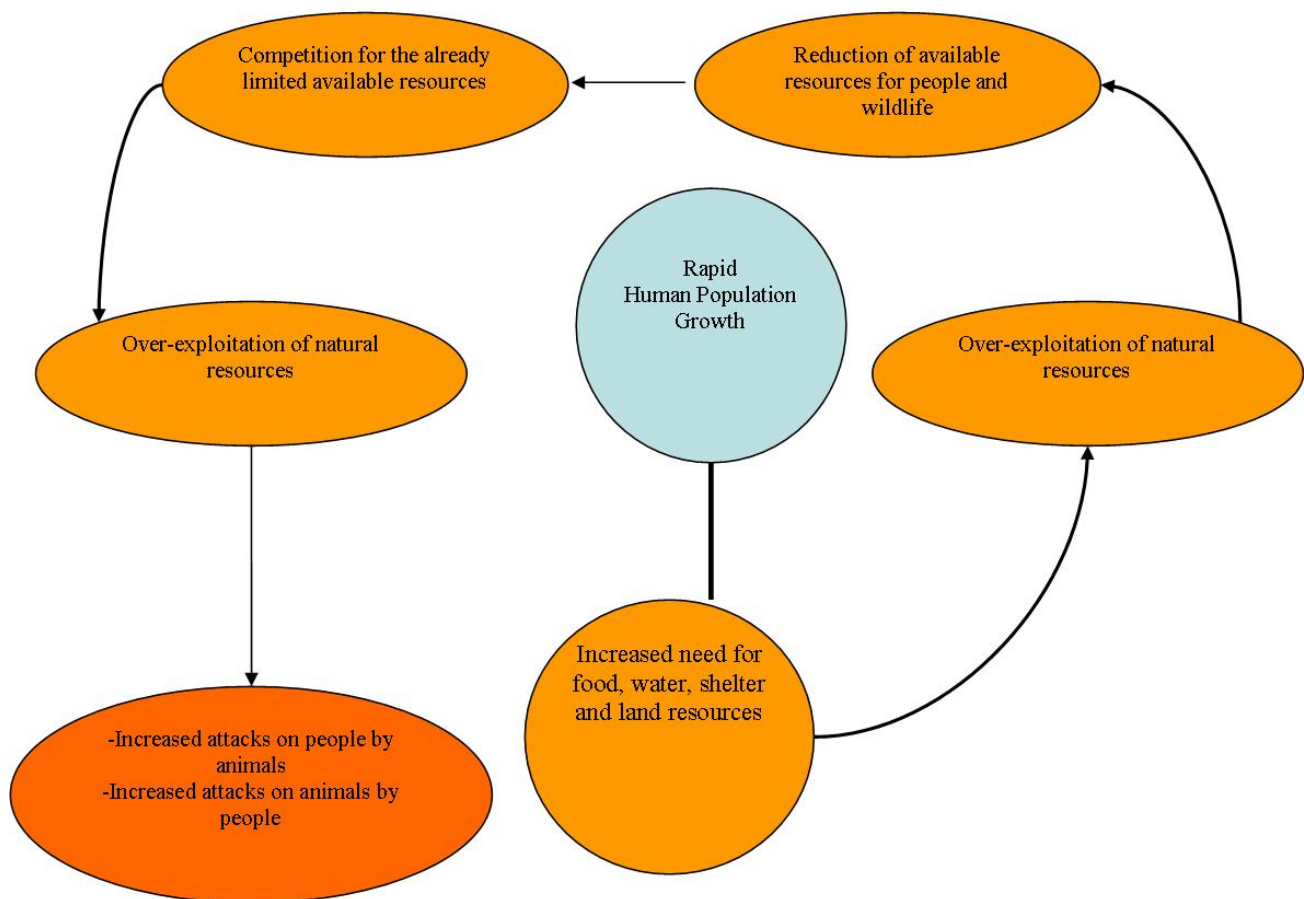
An example of the predator-prey relationship in the Rupununi is between Jaguars (*Panthera onca*) and the White Tailed Deer (*Odocoileus virginialis*) and shown in the figure below. Initially, the number of Jaguars in the area was 6, and the number of Deer in the area was 18. Over time, as the Jaguars feed on the Deer, their population increased to 10, and the Deer population decreased to 5. When the population of Deer decreased, the food that is available to the Jaguar became less; therefore their numbers eventually decreased to 4. As the number of Jaguar became less because of limited food, the Deer population increased to 22, as there were not many Jaguars to feed on the Deer. With abundant Deer, the Jaguar population once again increased to 8. As these two populations continue to depend on each other, they continually affect their populations.



Resource sheet 1.3b Conflicts between people and large predators

As our populations continue to grow, we are constantly finding ourselves in situations where we are in direct and indirect conflict with wildlife. There are a number of different types of people–wildlife conflicts and these include:

- 1) Attacks on people, for example, Black Caiman (*Melanosuchus niger*) attacks on people resulting in serious injuries or fatalities;
- 2) Attacks on livestock, for example, Jaguar (*Panthera onca*) attacks on cattle;
- 3) Crop raiding, for example, Agouti (*Agouti paca*) feeding on the root of the cassava plant on people’s farms. Cassava is the raw material for the main staple in the Rupununi, and the predation of this by wild animals would result in conflict with farmers;
- 4) Competition for wild forage with humans, livestock or with wild animals, for example, Brown Capuchin (*Cebus appella*) feeding on wild fruits that people also need to use;
- 5) Competition for prey with human hunters, for example, Giant Otter (*Pteronura brasiliensis*) being an opportunistic predator would focus its hunting in areas where fish is concentrated, in the same manner that people would.



Conflicts between humans and animals exist wherever you find people and animals living close to each other. This is mainly because of the competition for resources such as water, food and land for home (see figure above). This is not a new occurrence, but over recent times, it has intensified as human populations continue to grow, and as natural habitats continue to be changed and lost.

The damage and destruction caused by a variety of animals to human property - and sometimes to human life - is a very real and of great consequence to human communities. For this reason when animals are often killed, captured, or otherwise harmed as a mean of protecting one's food, water, and life, these conflicts become a prime threat to the population of species.

In addition to the intensified pressures placed on natural resources as populations continue to grow, these conflicts are the sometimes the result of the many regulations being in place that focused on the preservation of species, without considering the livelihoods of people that also live in the area. For example, when species are protected, their populations increase. This has positive and negative effects, particularly if the species in question is one that requires large expanses of habitat, and is predators. Communities that are also found within this area may encounter attacks on their property as well as their lives. However, the laws and regulations do not include any provisions for these types of incidences. Today there is a gradual shift in the way of thinking about conservation and the realisation that if biodiversity is to be maintained, the needs of local communities must also be taken into account.

Resource sheet 1.4a Biodiversity and issues relating to the survival of people and species

The Earth is home to a wide variety of life. This is referred to as biological diversity or biodiversity. This is greatly to the wide variety of ecosystems present in the different parts of the world – ranging from the coldest regions to the hottest regions of the Earth. This fact shows how truly diverse wildlife is in terms of specific species that have specifically adapted themselves to surviving in their different habitats. Over the course of many years, we have slowly begun to appreciate the need to study and monitor the various species of wildlife that make up such rich ecosystems. As a result, we have come to better understand and appreciate the individual functional roles (also referred to as niche) of such species.

Many times, wildlife niches in nature play very important roles in maintaining a balance in nature. For example, the niche of fruit-eating bats, birds and insects in nature are helps in the role of pollination of plant species. Plant wildlife in general is commonly known to help in holding the soil particles together and in so doing, prevent soil erosion. More importantly, to help in the recycling of oxygen; and like water, it is essential for all life on Earth. So it is with no uncertainty that we can say that biodiversity actually boosts ecosystem productivity where each species, no matter how small, all have an important role to play. More so, it is this combination that enables the ecosystem function must efficiently.

Almost all cultures have in some way or form recognized the importance that nature, and its biological diversity has had upon them and the need to maintain it. Naturally, wildlife has contributed in so many ways to providing a healthy and rich environment for people over the years. In the same breath; it is important to also mention the numerous ways in which it has positively had an impact on human populations in other ways. Firstly, we know how many important plant species have been grown as crops worldwide for food consumption purposes.

Over the years, local use of herbs and other plants parts have been utilized for various medicinal purposes varying from diabetes to treating of external wounds (a common example is the seed of the Crabwood tree from which an oil is extracted that has several medicinal uses). Animal wildlife has also been used by man for food consumption purposes ranging from meat and dairy products. Wildlife resources have also been used for a variety of handicrafts such as balata products and basketry.

On the other side of the coin, due to human greed, politics and general ‘want’ for power, we have indulged in several activities that many a times affect nature’s natural balance. Human activities have been the source of many negative impacts on the world’s wildlife populations. With our increasing human population, more demand is therefore on our natural resources worlds. Wildlife populations have been and continue to be heavily affected by human’s activities and may be directly or indirectly.

Examples of activities which have direct impacts on wildlife populations are hunting (both as a sport and for food) and trapping for the continuously growing business of the wildlife trade. Hunting has long been a hobby for some where particular species are targeted. In other case, in a much more serious light, certain species are hunted for a particular body part that holds a high market price. An ideal example of this is the ivory trade which is prevalent in Africa, where hundreds of elephants are killed remorselessly just to be stripped of their tusks. What is sad is that such species as these African elephant are protected by laws and so hunting is usually illegal. Here in Guyana, the Black Caiman –one of our ‘Giants of El Dorado’ was hunted for its hard leathery

skin which was valued in the production of bags, belts and shoes. It reached the stage where populations in the wild dropped drastically to the extent where they became endangered and as a result a law was established that prevent the killing of any Black Caiman since.

Lastly, hunting of species may be done for the wild meat trade. Many times hunting may not be conducted in a sustainable manner and when we do recognize that populations have decreased, it is usually to the point that the species in the wild are very small in number and as a result be extremely threatened or on the brink of extinction. In many case quotas and opened and closed hunting seasons are usually established by wildlife management authorities to help protect such species. Unfortunately, in many cases, monitoring and actual implementation of such laws are not easily enforced.

Trapping has also had an impact on wildlife species similar scenarios to the wild-meat trade and hunting where existing populations are not usually monitored and so species are removed at a faster rate than which remaining populations can recover. Similarly, quotas and laws that may exist may not be heavily implemented or enforced.

There are also indirect impacts due to human activities which have been known to have impacts on wildlife species. Such impacts would include destruction of habitats. As human populations grow, more space is required which leads to the clearing of natural landscapes to allow the construction of roads and buildings. Clearing of areas may also be for the use of a particular resource such as mining or timber harvesting. In such a case, even though wildlife species themselves are not targeted, such activities will affect existing wildlife populations due to loss of habitats. Wildlife depends on their habitat for shelter and food. Similarly, aquatic wildlife is also threatened indirectly through water pollution. Gold-mining has been the source of much water pollution in many of Guyana's interior locations. This is due to the use of mercury (a heavy-metal) which is used by miners in the extraction process. Heavy concentrations of mercury can build up in the food chain and as a result not only is the species in the aquatic habitats are threatened, but also terrestrial species.

Other forms of pollution – namely land, air and even noise – have heavy impact on wildlife species. When animals are forced to flee to find new habitats and environments they encounter competition for resources which are being sharply reduced as a result of human activities. Other indirect threats to wildlife includes introduction of exotic species. In worse-case scenario, an exotic species will lead to the extinction of a native species due to competition for the same resources such as food.

In conclusion, it is important to recognize, that wildlife (our 'living' natural resources) use by people needs to be in a sustainable manner and populations monitored so as to prevent extreme threats to its survival or worst, extinction. Furthermore, activities which are known to have negative impacts need to be carefully monitored since it disrupts the natural balance of nature. Our impact on one species directly will eventually have impact on other species in the same environment. For example, simple habitat loss of a species would result in that species finding a new source of food and shelter. This may result in intra-specific and inter-specific competition for the now limited resources. In such scenarios in nature, it is always about survival of the fittest.

Definition of terms

Aquatic species - These are wildlife species (both plants and animals) that have habitats directly associated with water bodies such as ponds, lakes, rivers, creeks and seas and oceans.

Biological Diversity - Composition of both flora and fauna in their living and non-living environment.

Conservation - The protection of wildlife species through monitoring and sustainable use

Ecosystem - The combination of several different species of plants and animals co-existing in a number of habitats and their physical environment

Extinction - This is the loss of a species in the wild .i.e. population size in zero.

Exotic species - Refers to species not native to a region.

Inter-specific competition - This is the competition between two or more different species for the same resources (i.e. food, water and space).

Intra-specific competition - This is the competition between individuals of the same species for resources (i.e. food, water and space).

Native species - Refers to species of wildlife that can be found naturally in an area.

Population - Group of one species of wildlife.

Pollution - The introduction of substances into the environment, resulting in negative effects causing danger to human health and ecosystems.

Species - a species is one of the basic units of biological classification

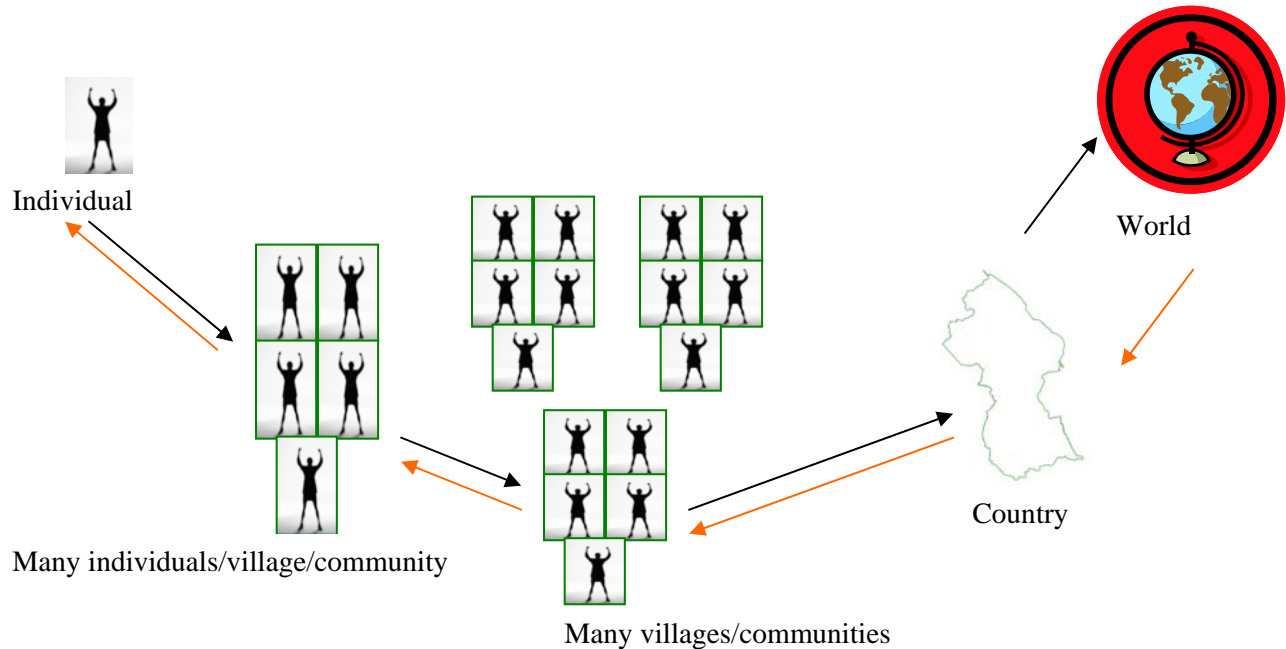
Threatened - Species that has been recognized to be in danger due to negatives impacts on wild populations.

Quotas – a standard limit on quantity (can be a minimum and maximum number)

Terrestrial species - Refers to species of wildlife that have habitats on land.

Wildlife - General term used for plant and animal species.

Resource sheet 1.4b The path of regulations being formed from the individual to international organizations



Laws, regulations and conventions are formed because of the needs and interests of individuals being brought to the attention of decision makers (see figure above). In the instance of the Black Caiman, in the 1970's people made observations that the population of the Black Caiman was getting smaller. This was then brought to a village level, in many villages in the range of the Black Caiman. This then reached the level of the government, and then to the international community. In the world, there is an international organization whose function is to ensure that animals and plants are protected. They made a firm request that all the governments of all countries where the Black Caiman can be found make laws to ensure the protection and to prevent the harvesting and trade of the Black Caiman. This organization is extremely powerful and their request was granted by governments, had it not been, then those countries would have been blacklisted and would have faced international pressures to confirm to the request of IUCN. This was the process that was followed those many years ago, that resulted in the Black Caiman being protected by law in our country. Because of that protection, their populations have recovered. In the same manner in which information was transferred - from the individual to the community to the country level and then to the international community – it has to be done again. This is the only way that the IUCN would have information to change any decision on the protection status of the Black Caiman. They have to receive evidence of the population increase and of the conflicts that exist between people and the Black Caiman in countries where they can be found.

Resource sheet 1.4c National laws for wildlife management and their relationship to international conventions and treaties

Guyana has long recognized our great biodiversity and so understands the importance of protecting and conserving it. Laws for the management and protection of wildlife have been established nationally and internationally. These laws help to better manage the use of wildlife so as to not have devastating impact on existing populations. Laws may refer to wildlife in general while some have been established for specific species groups. An outline of key laws and regulations, and their impact on the NRAMP are given in the NRAMP 2008.

Convention on Biological Diversity (CBD)

On May 22, 1992, the Convention on Biodiversity was adopted and was opened for signature on 5th June 1992 in Guyana. The Convention entered into force on 29th December, 1992. Guyana signed onto the Convention that year and subsequently ratified it two years later. The convention on Biological Diversity was inspired by the world community's growing commitment to sustainable development. It represents a positive step forward in the conservation of biological diversity, the sustainable use of related resources, and the fair and equitable sharing of benefits from the use of genetic resources.

As a result of signing onto the Convention on Biodiversity, Guyana has since engaged in the establishment of regulations for species protection. The Species Protection Regulations 1999 is a regulation made under the Environmental Protection Act 1996 (Sec 68). This Regulation was published by the Authority of the Government in the Official Gazette on Wednesday 29th September, 1999. The main objective of these regulations is to provide protection of particular species of prescribed flora and fauna.

Convention on International Trade of Endangered Species (CITES)

This Convention has places limitations on the use of wildlife by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. The species covered by CITES are listed in three (3) Appendices, according to the degree of protection they need.

IUCN – Redlist

IUCN stands for 'International Union for the Conservation of Nature and Natural Resources'. Use of the name "World Conservation Union" began in 1990. This treaty assists in conservation of wildlife by assessing the status of species, subspecies, varieties and even selected subpopulations on a global scale. In doing so, a Redlist has been generated which highlights specific taxa that may be threatened with extinction. This Redlist highlights those taxa that are facing a higher risk of global extinction (listed as 'critically endangered', 'endangered' and 'vulnerable'). It also includes information on taxa that are categorized as 'Extinct' or 'Extinct in the Wild'; on taxa that cannot be evaluated because of insufficient information (indicated as 'data deficient'); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme ('near threatened').

Agenda 21 (as outlined in <http://www.iisd.org/rio+5/agenda/agenda21.htm>)

Agenda 21 explains that population; consumption and technology are the primary driving forces of environmental change. It lays out what needs to be done to reduce wasteful and inefficient consumption patterns in some parts of the world while encouraging increased but sustainable development in others. It offers policies and programmes to achieve a sustainable balance between

consumption, population and the Earth's life-supporting capacity. It describes some of technologies and techniques that need to be developed to provide for human needs while carefully managing natural resources.

Agenda 21 provides options for combating degradation of the land, air and water, conserving forests and the diversity of species of life. It deals with poverty and excessive consumption, health and education, cities and farmers. There are roles for everyone: governments, business people, trade unions, scientists, teachers, indigenous people, women, youth and children. Agenda 21 does not shun business. It says that sustainable development is the way to reverse both poverty and environmental destruction.

A major theme of Agenda 21 is the need to eradicate poverty by giving poor people more access to the resources they need to live sustainably. By adopting Agenda 21, industrialized countries recognized that they have a greater role in cleaning up the environment than poor nations, who produce relatively less pollution. The richer nations also promised more funding to help other nations develop in ways that have lower environmental impacts. Beyond funding, nations need help in building the expertise—the capacity—to plan and carry out sustainable development decisions. This will require the transfer of information and skills.

Agenda 21 calls on governments to adopt national strategies for sustainable development. These should be developed with wide participation, including non-government organizations and the public. Agenda 21 puts most of the responsibility for leading change on national governments, but says they need to work in a broad series of partnerships with international organizations, business, regional, state, provincial and local governments, non-governmental and citizens' groups. As Agenda 21 says, only a global partnership will ensure that all nations will have a safer and more prosperous future.

Resource sheet 1.4d Guyanese NGOs and agencies that advocate species protection

Conventions and treaties such as CITIES and Agenda 21 are all supported by existing National laws that support the protection of species in Guyana. Within Guyana, several institutions have been identified or associated with the protection of species by working directly with such conventions and other regulations.

Guyana's Wildlife Division, for example, is responsible for dealing with a legal licensing system and to give advice on the effects of trade on the status of the species. Current legislation in Guyana principally addresses the trade in live animals and since it provides no basis on which to regulate the collection of wild meat being supplied to a growing domestic and overseas market. Though the National Forestry Action Plan (NFAP) in Guyana calls for the regulation and administration of wildlife resources, the body responsible for overseeing the day-to-day control of wildlife use was established in 1988 and has had little impact on hunting since its inception. Draft legislation designed to provide some framework of protection and rationale utilization of Guyana's fauna, in particular those species which are rare or sensitive to widespread hunting has been waiting parliamentary review since 1987, despite the fact that Guyana is a current signatory to the Convention on the International Trade in Endangered Species (CITES).

Other organizations that deal directly with conservation projects and research work directly with such conventions and so have a great role to play in the overall protection of species and overall wildlife management. Such conservation-based organizations include Iwokrama, Conservation International and World Wildlife Fund (WWF). While these local organizations look at a conservation of several of species, in keeping with the principles of sustainable development, there is also other conservation work being done for specific individual species. Two such examples would be the 'Guyana Marine Turtle Conservation Society' (GMTCS) looks specifically at the conservation/protection of marine turtle species and the 'Black Caiman Research' that is presently ongoing in Yupukari. Whether looking at the protection and conservation of one or several species of wildlife, what is important to note, is that these institutions help to assist in the implementation and adhering to the rules and regulations of our national laws and the conventions/treaties that seek to protect our wildlife species.

Resource sheet 1.5a The role of traditional management in species populations in the North Rupununi

Hunting is done mostly around or close to farming areas. In Makushi culture, potential game is treated with respect killed only on account when needed. Traditional beliefs and taboos about not eating certain animals at particular life phases (baby, young children, menstruating women, pregnant women, and lactating women) were a form of managing species populations. Another form of managing wildlife populations in the Rupununi is by hunting in specific animals in particular months; these months that are no hunting months are most usually the months when the animals are nesting, pregnant or with young ones. Hunting and fishing are also done in specific areas when a particular fish or 'wild meat' is required.

The NRAMP 2008 has greater detail on traditional cultural practices.

Activity:

Do you know any other traditional practices that are geared towards the management of animals that are hunted for food in the Rupununi?

Resource sheet 1.5b Community Knowledge of the Black Caiman

Scientific Name: *Melanosuchus niger*

Local Name: Black Caiman

Makushi Name: Kuratu

Wapishiana Name: Kanawad

Similar species: - The Black Caiman is most similar to the Spectacled Caiman. The Spectacled Caiman is different in colour and size, and looks as if it has a pair of spectacles on.

Behaviour: -They travel by them selves or in pairs and the travel during the day and the night when migrating upstream during the wet season. During the dry season they are usually found in the main rivers in deep pools and along the sand banks. They are very good swimmers and are also capable of walking relatively long distances on land.

Reproduction: - The Black Caiman females usually lay between 30 – 40 eggs in large nests made of twigs, dry branches and other plant debris/fallen material in shaded areas or alongside big grasses in the savanna. Hatchlings would usually leave the parent after approximately one month. The parent protects the hatchlings. The hatchlings would come to humans if the caiman call is imitated.

Diet: - Fishes, water birds, small mammals found in or near the water such as deer, labba, agouti, capybara, and mud.

Distribution: The Black Caiman is found in ponds, creeks, lakes of the Essequibo River and her tributaries of Siparuni, Burro- Burro, and Rupununi and the Rewa River.

Relationship with people: - in the 1960's Black Caimans were harvested for their skin, and were exported to Brazil via Gomes Landing and the Lethem Takatu crossing. In 1968 there was a national and international ban on the harvest and sale of the Black Caiman. As a result of this ban the Black Caiman population has recovered. However, there have been many instances of Black Caiman attacks on people and their hunting dogs. The eggs of the Black Caiman are sometimes eaten by people, and well as by the adult Black Caiman. Hatchlings are also sometimes eaten by adult caimans, Giant Otters, and the Rufescent Tiger Heron.

Activity:

At the end of the session, participants must develop a strategy for managing a conflict situation between people and the Black Caiman or between people and an animal that exist in their village, using the steps in NRAMP. This will show whether participants have understood the content covered in the activities and resource sheets, and if they are ready to move onto the next scenario.

Resource sheet 2.2 Biodiversity and people

The following is an excerpt from an essay entitled “Biodiversity is threatened by Human Activities” that has been adapted from Life on Earth (Audesirk & Audesirk) Earth Watch pg 14.

“Ever since the United Nations’ 1992 “Earth Summit” in Rio de Janeiro, Brazil, the word biodiversity has jumped out at us from magazines and news articles. What is biodiversity, and why should we be concerned with preserving it? In his article “Defining Biodiversity,” biologist and author Peter Raven describes biodiversity as the sum total of all the living organisms in a particular area and all of the interactions among them. Why should we be concerned with preserving biodiversity and maintaining biological communities?

Destruction of tropical rainforests by indiscriminate logging threatens Earth’s greatest storehouse of biological diversity. Interrelationships such as those that have evolved between the *Heliconia* and its hummingbird pollinator sustain these diverse communities that are threatened by human activities.

Over thousands of years, organisms in a given area have been moulded by forces of natural selection exerted by other living species as well as the nonliving environment in which they live. The outcome is the community, a highly complex web of interdependent life forms whose interactions sustain each other. By participating in the natural cycling of water, oxygen, and other nutrients, by producing rich soil and purifying wastes, these communities contribute to the sustenance of human life as well.

The tropics are home to the vast majority of all the living species on Earth, perhaps 7 to 8 million of them living in complex communities. The rapid destruction of habitats in the tropics as a result of human activities is producing high rates of extinction of many species. Aside from ethical concerns over eradicating irreplaceable forms of life, as we drive unknown organisms to extinction, we lose potential sources of medicine, food and raw materials for industry. The concept of biodiversity has emerged as a result of our increasing concern over the loss of countless forms of life and the habitat that sustains them.”

The excerpt of the essay above represents the views of one person on the role of biodiversity and the impact of human activities on biodiversity.

Activity:

What are your views on biodiversity and the link between people and the environment, living and nonliving?

Resource sheet 2.3a Natural resource management strategies

What are natural resources?

Natural resources are those things that can be found in the environment around us that we use to enable us to live. These are things that you do not plant nor grow nor rear but collect from your surroundings/environment to use. For example, wild birds, wild animals, timber trees from the forest, mud and sand.

What is management?

According to the New Webster's Dictionary –management refers to the act of managing. To manage is to have under command or to treat with judgement. Therefore natural resource management refers to the act of managing or controlling or commanding our use of the things that we use from the environment around us.

Indigenous communities have been practicing natural resource management for as long as they have depended on the environment around them for survival. This management came in the form of stories, and beliefs of using or not using resources at various stages in life. Village elders would in the past say which areas could and could not be used for extraction of materials. These were all forms of management of the resources that were being used so that those resources would continue to exist. The continuity in existence of these resources is the very prime goal of management of resources, while at the same time ensuring the survival of the living things including people that depend on those resources.

People are an integral part of the ecological and environmental system, and because of their livelihoods and economic development are linked to nature and her resources, they must be included in any process that relate to the management of natural resources be it species, or habitat. The long term success of conservation and management is heavily dependent on the support from people, and as such these decisions should be made in the most appropriate cultural context.

There are different ways of viewing resources found in nature and their use, and natural places:

- 1) Romantic-transcendental conservation ethic – This view is set on the basis that nature and natural things has uses other than for those that facilitate human economic gain. This forms the core of many private conservation organisations found in the world, whose prime goal is to save natural area in a pristine state for their value in nature. This view advocates pure wilderness and a spiritual appreciation for nature and natural things.
- 2) Resource conservation ethic – This is where natural resources are managed in such a way to facilitate multiple uses by people. In this view, nature and its components are seen as useful, useless or dangerous to people, and where natural resources contribute to the material enhancement of human life. This approach stressed the importance of equity, in that there should be fair distribution among users both today and tomorrow, and for efficient use, so waste is limited or non-existent. This view advocates a utilitarian standpoint of the world and the natural resources found therein.
- 3) Evolutionary-ecological land ethic- This approach demonstrates that nature is not simply a collection of independent factions, some useful and others not, but it is in fact a complicated and integrated system on processes and components that depend on each other. For nature to function properly, all its parts must work well and together.

Resource sheet 2.3b Fact sheet on the Arapaima Management Plan

Why the Arapaima Management Plan was developed

Harvesting of *Arapaima* in the North Rupununi began when trading with Brazil started in the early 1960's. *Arapaima* harvesting and trade with Brazil became an important source of income, as *Arapaima* was plentiful and there was limited enforcement as the Government lacked the resources to do this. By 2001, the population of *Arapaima* in the North Rupununi decreased to an estimated 425 individuals over 1 meter long. This reduction threatened local livelihoods and the wetland ecosystem. Local fishermen claim that the re-enforcement of the ban has resulted in the population increasing as there is less fishing pressure on the *Arapaima* in the area.

How was the Arapaima Management Plan developed?

The timeline was as follows:

1998

Local communities, Iwokrama and Government Agencies met to discuss the decline in the *Arapaima* populations and the weak enforcement of the Regulations of the Fisheries Act.

2000

1. Local communities and Iwokrama began surveys for *Arapaima* in the Essequibo River.
2. Iwokrama staff travelled to Mamiraua Reserve to learn about *Arapaima* surveys and management.
3. Local communities and Department of Fisheries met and decided to ban *Arapaima* fishing for a few years and to begin the development of a management plan.

2001

NRDDB developed a Fisheries Task Force to begin working with local fishermen.

Mamiraua staff trained local fishermen in Guyana on how to conduct *Arapaima* surveys.

Local fishermen and Iwokrama staff conducted the second *Arapaima* stock assessment for 187 lakes in the North Rupununi Wetland.

2002

Representatives from 12 of the 13 communities of the NRDDB, Leandro Castello and Deirdre Jafferally met to discuss the design and implementation of the management system for *Arapaima* in the North Rupununi.

1st Draft for the management of *Arapaima* completed and sent to each of the then 13 members of the NRDDB. Visits to all communities were also made by D. Jafferally, L. Castello and Zacharias Norman to explain the content of the draft management plan.

Draft *Arapaima* Management Plan revised by the Community Fisheries Committees' representatives, L. Castello and D. Jafferally.

Proposed Management Plan presented to the local leaders of the North Rupununi at a statutory meeting of the NRDDB.

Third version of plan presented to government institutions (Ministry of Amerindian Affairs, Ministry of Local Government and Regional Development and EPA for their comments and suggestions based on their specific mandates as it relates to management of *Arapaima*.

Arapaima Management Plan including comments and suggestions from various government institutions submitted to Minister of Fisheries with a request for approval.

DID YOU KNOW THAT ...?

- From the 1953 Fisheries Act, there were regulations that banned the exploitation of *Arapaima*.
- People from the North Rupununi did not harvest *Arapaima* before 1960.
- In April 2001, the ban on harvesting *Arapaima* based on the Fisheries Regulations 1973 was re-enforced by the North Rupununi District Development Board (NRDDB). This was aimed at allowing the *Arapaima* stock to recover.

Who were involved in the development of the Arapaima Management Plan?

Local Fishermen

NRDDB

Iwokrama

Mamiraua Institute

Wildlife Conservation Society

Ministry of Fisheries, Crops and Livestock

Environmental Protection Agency

Ministry of Local Government and Regional Development

Ministry of Amerindian Affairs

What does Arapaima Management Plan entail?

The Arapaima Management Plan follows a count based fishing quota system. There are six components of this plan. These are:-

- 1) Counting – Number of *Arapaima* over 1 m must be counted annually in all the managed lakes at the start of every dry season.
- 2) Monitoring – Count is analyzed in relation to count and harvest information from the previous years, to find out whether the population is increasing, is the same or is decreasing.
- 3) Fishing Quota Determination – Information gathered from counting and monitoring will be used to determine the number of adult individuals to be harvested.
- 4) Fishing Quota Sharing – The individuals to be harvested are shared among the *Arapaima* fishermen, or communities. The fishing quota can be shared in different ways: - an equal fishing quota to each community, an equal quota to each *Arapaima* Fisherman, and a different quota to each *Arapaima* fisherman depending on the needs, location and behaviour.
- 5) Fishing – *Arapaima* fishermen will harvest *Arapaima* in accordance to three main rules. These are: 1. Only adult individuals are harvested; 2. Adult individuals are harvested only when they are not reproducing; 3. The number of individuals harvest each year is equal to the fishing quota.
- 6) There will be selected licensed fishermen that will be permitted to harvest *Arapaima* from within the described area as specified in the plan. This area is within the following natural boundaries – Essequibo River from the confluence of Coco Creek to the confluence of the Siparuni and Essequibo Rivers; on the Rupununi River from Karanambu to the confluence of the Rupununi and Essequibo Rivers; on the Rewa River from Nut Pool to the mouth; in Bat Creek from Lime Landing to the mouth and on the Burro Burro River from Bamboo Landing to the confluence of the Burro Burro and Siparuni Rivers.

According to the plan all fishermen from the thirteen communities will be required to be registered, however not all registered fishermen will be permitted to harvest *Arapaima*. This is as a result of the specific skills that are required to carefully judge and select the right size of *Arapaima* for harvest. The *Arapaima* Fishermen from the thirteen communities specified by the plan will receive a special fishing license from the Ministry of Fisheries based on recommendations from the Executive Fisheries Committee.

Participation of all stakeholders is important for the success of the *Arapaima* Management Plan. There will be two reporting systems to ensure that there is a high level of participation. One system will be aimed at monitoring the fishermen's activities and the other aimed at receiving guidance from governmental institutions. The key institutions involved in these reporting systems are the Environmental Protection Agency (EPA), Ministry of Fisheries, Crops and Livestock, Iwokrama, Ministry of Local Government and Regional Development.

The general goal of the *Arapaima* Management as described in the plan is to:-

“Develop a system where:

Organized fishermen will aim to recover the Arapaima population by regulating and sharing the number of Arapaima harvested among fishermen using scientific data, common sense and the number of individuals counted every year in the area. Fishermen will only harvest adult Arapaima and will not fish Arapaima while they are involved in reproductive activities. Arapaima trading will be centralized and aim towards providing high prices for a high quality product.”

The Thirteen Communities Included in the Arapaima Management Plan are:-

Annai Central, Rupertee, Kwatamang, Surama, Wowetta, Aranaputa, Yakarinta, Massara, Toka, Rewa, Crashwater, Apoteri and Fairview.

Resource sheet 2.4a Monitoring and its role in natural resource management

What is monitoring?

Webster's Dictionary defines monitoring as - "To watch, check or observe for a special purpose."

The Oxford Dictionary defines monitoring as – "To observe, supervise, or keep under review; to measure or test at intervals, especially for the purpose of regulation or control, or to check or regulate the technical quality of something."

In short therefore, monitoring is what we do on a daily basis, when we notice an event; we record that event, to then check back on, over time as we continue to observe, to see if and how that event has changed.

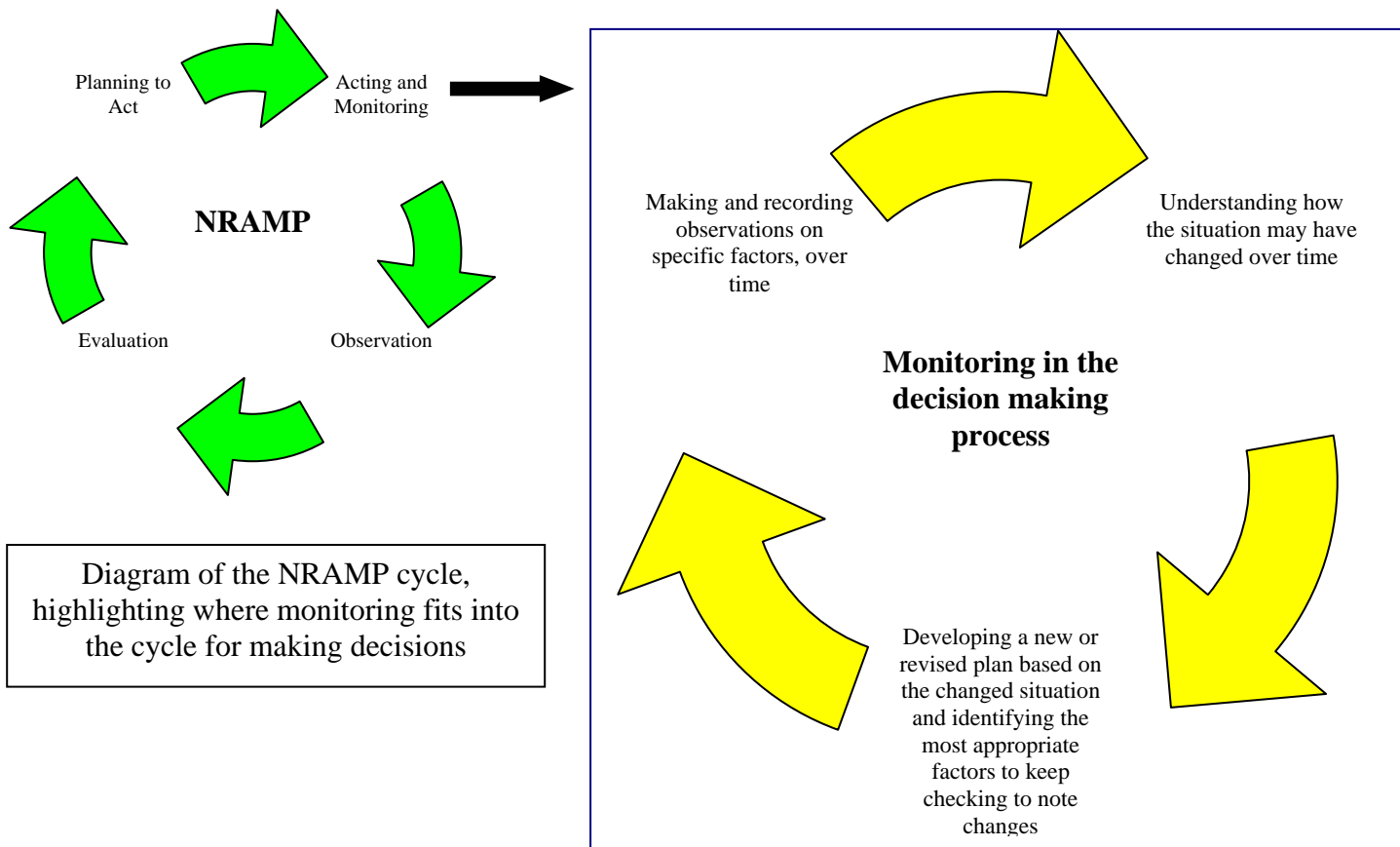
The importance and relevance of monitoring in the sustainable management of natural resources and livelihoods

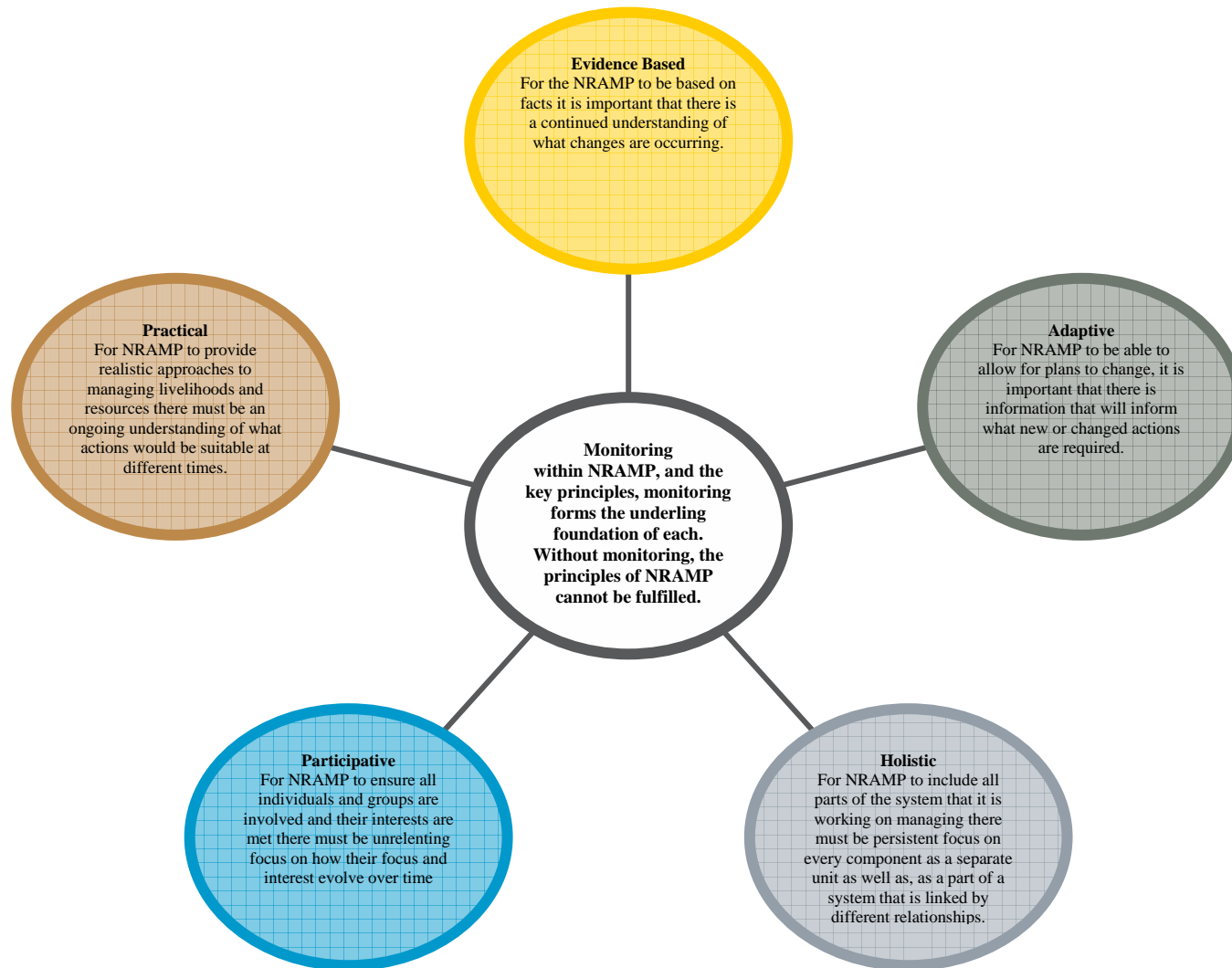
In the management of natural resources, where the survival and continuity of the resources lie in the quality of the decisions that are made, it is especially important that there is a continued effort to understand the status of the resources and how they have changed over time. Understanding these changes will allow for decisions to be made based on the current situation (see figure below).

The monitoring of natural resources does not necessarily have to be a complicated or expensive process. Monitoring is about providing adequate and appropriate information to be able to change or remedy our actions as we use natural resources, to ensure sustainability of our livelihoods and at the same time maintaining the natural balance of the environment.

In the North Rupununi Wetlands in Central Guyana, where over fishing, hunting and gathering in the area have begun to take their toll on some species; the overharvesting of these species may be seen as an introduction to more extensive activities, such as logging and mining. Without effective management planning and decision-making, that is informed by monitoring programmes local communities are at risk of losing valuable resources and local livelihoods. To this end communities in the North Rupununi are actively seeking means of collecting the relevant information that would allow for the effective management of the natural resources found there.

Within the North Rupununi Adaptive Management Plan (NRAMP), monitoring is important in ensuring that the actions that are planned reflect what the current circumstances are. Monitoring is therefore at the very core of the principles of NRAMP (see figure below).





Resource sheet 2.4b How to do monitoring for decision making

In designing a monitoring programme, it is important that there are particular stages:-

1. Defining a clear purpose for monitoring- PLAN

Before commencing the development and implementation of a monitoring programme, particularly in natural resource management it is important to have a clear understanding on what we would use the information gathered from monitoring for i.e. the goal. For example, before setting a monitoring programme to look at the changes in the weather, we would have to know what specific questions we would like to answer.

Some questions that we might want to answer in designing a monitoring programme for weather can be: -

How does the amount of rainfall change in the different months of the year?

How does the maximum and minimum temperature differ in the morning as compared to the afternoon?

How does the amount of water vapour in the air differ in the morning as compared to the afternoon?

By clearly listing and understanding what it is that we would like to know, we can then collect data that will allow us to answer these questions.

In setting up a monitoring programme, these are a few things that should always be considered:-

1. What is the most appropriate thing that should be monitored to understand what is happening? - *Setting indicators.*
2. How often should you monitor to find out what exactly is happening? - *Setting your data collection process.*
3. Does the information you are collecting answer your questions? - *Evaluating your indicators.*
4. Is your monitoring providing information that can be useful to other groups? - *Analyzing your data so that as many groups as possible can use it.*
5. How often do you need to present the information, to review decisions? - *Presenting your information.*

2. Data collection - DO

Before commencing data collection, the uses of the data should be clearly understood. This will in turn inform what data needs to be collected. For example, if we are trying to understand what the hunting pressure is on deer, we would collect data specific to the deer. It is very important that the data that is collected is relevant and useful in making decisions.

Once the data to be collected has been identified, the time and frequency of data collection should be set. The frequency of data collection is entirely dependent on the questions that will be answered by the data. In setting the frequency of data collection, the resources that are available should be considered as well as the season.

Once monthly annually– This will provide the community with information for every month of the year. This will require a lot of time and resources to implement. The data collected every month is beneficial, however the information that can be derived from it,

can also be gained from collecting data less frequently. Data collection at this frequency will require much more resources (food, transportation and time) than any of the other suggested frequencies.

Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Season			Rainy Season				Dry Season			Small Rainy Season	
M	M	M	M	M	M	M	M	M	M	M	M

Twice in the rainy season and twice in the dry season annually – This will provide the community with information for both the rainy and dry season two times in one year.

Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Season			Rainy Season				Dry Season			Small Rainy Season	
	M				M			M			M

Once in the rainy season and once in the dry season annually- This will provide the community with information for both the rainy and dry season one time in one year.

Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Season			Rainy Season				Dry Season			Small Rainy Season	
	M					M					

Six times annually – This would provide the community with data twice in the rainy season, twice in the dry season as well as two times at the intersection between the rainy and dry season.

Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Season			Rainy Season				Dry Season			Small Rainy Season	
	M		M		M		M		M		M

The method for collection of the data is dependent on the type of data that is being collected. Methods that can be used include surveys, interviews, questionnaires/ datasheets, recorded observations by community members either opportunistically or according to a schedule. Please see the North Rupununi Monitoring Manual (2006) for more details on methods.

It is also extremely important that there is someone or persons who are responsible for the collection of the data, and who have experience and interest in doing this. In data collection, where the same methods are employed, the activity of collecting data will be monotonous, it is therefore important that there is more than one person or groups that collect the data, so as to reduce the possibility of people becoming bored and losing interest in the data collection process. After the data is collected, it is important that it is stored properly.

3. Evaluating the monitoring process - CHECK

In setting up and implementing a monitoring process, it is extremely important that we constantly check on the significance and effects of any actions. Data should be verified, so as to ensure that when decisions are made they are made on information that is factual.

4. Data analysis - REVIEW

After the data has been collected, it is very important it is reviewed and analysed. The process of data analysis is about examining the data, so that we can grasp what is happening. Data in its raw state, cannot be used effectively in the decision making process. It has to be analysed and presented in a way where decision makers can clearly understand what the data is saying.

Methods of simple analysis include calculating averages, looking for trends [similarities and differences], and looking for changes over time. Please see the North Rupununi Monitoring Manual (2006) for more details on data analysis.

Calculating Averages: - This is useful when you have numerical data, for example, the number of kg of fish consumed per family per week. If the village wanted to know the average amount of fish consumed by a specific family for one month or four weeks, then the total kilograms of fish per week would be found and then divided by four.

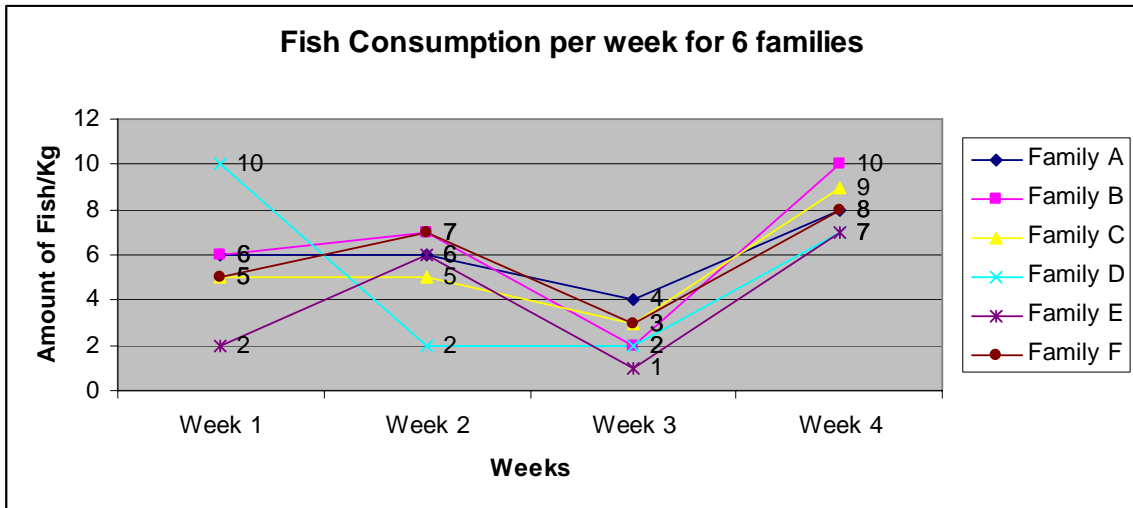
The total amount of fish consumed by Family A for the 4 weeks = Week 1 Total + Week 2 Total + Week 3 Total + Week 4 Total = 6+6+4+8 = 24 Kg

The average amount of fish consumed by Family A per week for the month = Total Kg consumed for the month divided (\div) by the number of weeks = $24 \div 4 = 6$ Kg.

Looking for trends (similarities and differences):- This is an extremely useful form of data analysis for decision making. For example if the village has collected information from six families on the amount of fish that is consumed per week. This data can be used to indicate whether there is any similarity in the amount of fish that is consumed by these six families.

Week	Family A	Family B	Family C	Family D	Family E	Family F
Week 1	6	6	5	10	2	5
Week 2	6	7	5	2	6	7
Week 3	4	2	3	2	1	3
Week 4	8	10	9	7	7	8

From the data in the table being presented in a line graph (see below), we can begin to tell similarities and differences in the amount of fish that is consumed by the six families.



What are some of the similarities and the differences that you can see?

From the chart we can also tell how the consumption of fish per family changed over the four weeks.

The presentation of the data that is collected is especially important. We can use lists, tables, graphs (line or bar) and summaries of people's views to represent the data collected. Many of these can be done using paper, pencils and brainpower. We will go through these methods of analysing and presenting data using paper, pen, brainpower, as well as using the computer to perform these same functions.

Remember the four steps shown in the diagram below!



Resource sheet 2.4c Indicators and their role in monitoring

It is important to monitor the health of systems within the environment. In the process of environmental monitoring and the monitoring of resources, indicators are chosen, measured, and observed regularly to highlight any trends or sudden changes in the state of the system, population, or individual, and the use of resources over time. Trends associated are often related to the way people value an environment, and as such the cultural and social values are very important in setting “concrete” environmental standards.

According to Bossel (1999)* –*“Indicators are our link to the world. They condense its enormous complexity to a manageable amount of meaningful information, to a small subset of observations informing our decisions and directing our actions. If we learn to watch the relevant indicators, we can understand and cope with our changing environment. If we follow the wrong signals, we get confused or misled, responding inappropriately, against our intrinsic interests and intentions, going in a direction in which we don’t want to go.”*

* Examples taken from Indicators for Sustainable Development – Theory, Method and Applications, by Hartmut Bossel. 1999.

In selecting or choosing indicators in the development of a monitoring plan, we should ensure that they have the following characteristics:

- Simple (easy to understand and to monitor),
- Measurable (verifiable, reproducible and can show trends);
- Accessible (can be monitored regularly, cost effective and consistent);
- Relevant (directly linked to the situation that is being monitored);
- Timely (provide early warning of potential problems).

Indicators can function as the direct link with the events that are happening around us. With indicators, we are able to gather large amounts of relevant information using a relatively small set of observations. This information can then inform the decisions we make and our subsequent actions.

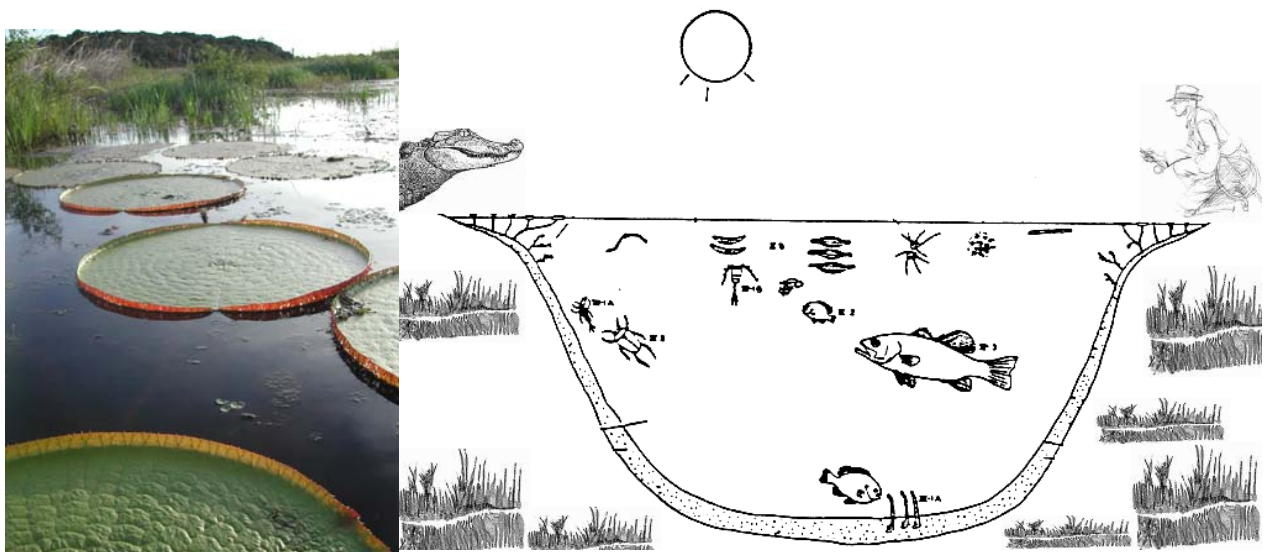
In our day to day lives, we constantly rely on indicators for information about the people we live with, or work with and the environment in which we live. For example a smile from someone is a sign of friendliness, a grey sky indicates the possibility of rain, a high body temperature tells of a possible illness and so on. Based on these simple indicators, and the observations we make, we are able to think and act in a manner to suit or change these situations.

In natural resource management, indicators are necessary to inform decisions at all levels; household, village, district, regional, national and international. The indicators that we choose must take into consideration all of the issues that are important, and not that may

seem relevant. For these indicators to relay all the important concerns it is therefore important that the process of setting indicators includes all groups, so that the interest of all groups are reflected. Given the need to include the interests of all stakeholders, we must be careful in that the number of indicators that is set is not too large, but also that they are not smaller than necessary. It is essential that indicators that are chosen are clear, understandable and practical.

The world we live in is very complex and closely linked. For us to understand what is happening and what occurrences mean, we cannot realistically make observations on everything. This is why we choose features or components to continuously over time, that will tell us how those features are doing, and at the same time give information on the state of the rest of the environment that is linked to that feature.

For example:- Devil Pond (see figure below) is used by people in the communities of the Annai District, as well as it is place where many plants, and animals can be found. If we wanted to know how healthy Devil Pond is, would we be able to monitor every type plant, fish, bird, reptile or mammal. No, it would not be realistic for us to do so. It would not be practical, nor would this fit into the criteria for choosing indicators that we discussed earlier.



In selecting indicators to monitor the health of Devil Pond and the resources that are found in the pond, we would have to together go through a list of criteria that would allow us to have indicators that tell us the story of Devil Pond, with the resources (human and financial) that we have.

The type of indicator to be used depends upon the process that is being monitored. According to Bossel (1999), there are three kinds of indicators that can be used. These are:

- a. Indicators for providing information on system states, specifically levels and stocks, for example the size of a population.
- b. Indicators for monitoring the rate of change a system undergo for example food sales per month, or food sales per month.
- c. This type combines information from state and rate of change indicators for example the average per person food consumption (from the food sales per month and the size of the population).

Indicators can be in the form of numbers or a statement. In the case on indicators that are in the form of numbers, they too need to be analyzed and converted to a statement that can then used in decision making.

Please review content in the NRAMP 2008 for additional examples and explanations of indicators.

Resource sheet 2.4d Data analysis and presentation

The following is fictional data for the purposes of practicing simple methods of data analysis and presentation of information.

This data represents the fish consumption in a village of 10 families.

Family Data

Family A: 4 persons

Family B: 6 persons

Family C: 2 persons

Family D: 9 persons

Family E: 4 persons

Family F: 4 persons

Family G: 8 persons

Family H: 6 persons

Family I: 3 persons

Family J: 9 persons

Fish Consumption Data

Family/Week	1	2	3	4
A	6	3	7	6
B	4	2	5	5
C	4	2	6	5
D	2	1	4	3
E	7	3	9	8
F	5	2	5	4
G	4	2	6	5
H	5	3	7	6
I	2	2	7	5
J	8	6	10	8

Tasks

Find the total fish consumption by the village

Find the average fish consumption per week for the month for each family

Plot a line chart showing the fish consumption over the 4 week period by the 10 families

Identify any similarities in the fish consumption by the 10 families

Identify any differences in the fish consumption by the 10 families

Are there any changes in the fish consumption over the four week period?

Find the average fish consumption per person for Family E, Family B and Family K

Scenario Completion

At the end of the session, participants must develop a monitoring programme for fish and or wildlife consumption in their village, using the NRAMP. A log frame must be used in the planning phase of this activity.

Resource sheet 3.1 Review of NRAMP using food for family example

Please see diagram below.

A family sat together to plan their food use for a month. They knew their goal was to ensure that all members had enough food to eat for the entire month. They knew they had to properly manage the food resources that they had, to ensure that it kept them for the entire month.

The first thing that they did was to make a check of the food resources that were available to them to use for the month, and how many persons would need to be fed. Once this was done the family then evaluated their situation in terms of the strong and potentially weak aspects of the food resources they have available to them. Based on their evaluation they were able to make plans on how they would manage the good and bad aspects of their situation to be able to achieve their goal of feeding the family for the month. After they developed their plans, they then set out to do the things they planned to do.

The learning cycle is a process that we use in our everyday life, in the situations we have to handle. The NRAMP just streamlines this approach, in a manner that it can be clearly understood and appreciated by all levels of stakeholders.

PLANNING TO ACT / What/When/Who/How

- the family would ration farine use per day @ approx. 1 lb per person day for the month
- the family will sell the remaining 90 pounds to have additional money that can be used for any other food items that they do not have on the farm
- 2 members of the family will go fishing every two days to supplement the protein
- the family will use the money to buy only food items that they cannot get from their farms such as salt, sugar, cooking oil, milk, rice, flour, beef
- the family will pick and use peas from their farm as an additional source of protein
- the family will use fruits and vegetables to ensure that family members get all other nutrients
- the family will do a weekly inventory of the food resources that are available

EVALUATION / Making sense of the situation

- there is sufficient farine
- there is limited protein and other sources of additional nutrients
- there is a limited amount of money available for purchasing food items
- the food resources that are currently available do not include farm produce, and catch from fishing and hunting

ACTING and MONITORING /Doing and checking

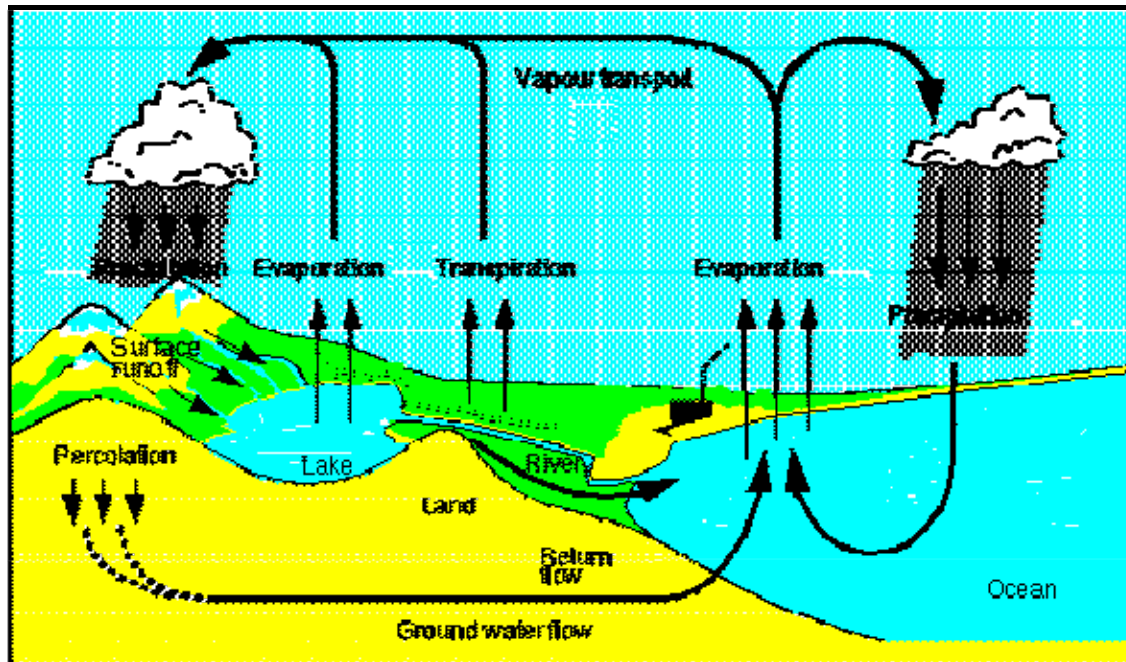
- the family will do all the things they said they would
- they will check on whether family members are getting enough to eat on a daily basis
- after each week the family will review the food usage based on the weekly inventory

OBSERVATION / Understanding the situation

- the number of persons in the family that needs to be fed is seven
- 3 (100 lbs each) bags of farine available for use for the month
 - 10 lbs dried salted (tasso) beef
- \$10,000.00 available for buying food items
- the family has a farm that has vegetables, and fruits

Resource sheet 3.2a What is the water cycle?

Water is critical for life on Earth: It nourishes people, plants, and animals and plays a major role in the planet's weather and climate. The hydrological or water cycle is Earth's way of transporting, cleaning, and recycling water between the surface and the atmosphere.



The water cycle, shown in the diagram above, is the way in which we are able to continue to have water for our everyday use. Moisture leaves the Earth's surface as a gas and can return in either a liquid or solid state. This continuous process of circulation of water is also referred to as the hydrological cycle.

The sun has a very important role in this cycle. Water from rivers, creeks, ponds, lakes is absorbed from the heat energy that is given off by the sun. There are three processes that are important in the hydrologic or water cycle. These are evaporation, condensation and precipitation. As the water is absorbed and mixes with gases in the atmosphere, it changes form – it becomes water vapour. This process is referred to as evaporation.

As the heated air in the form of vapour cools – clouds are formed. This process is referred to as condensation. Condensation is the opposite of evaporation where water vapour is converted to water (liquid).

Most of the water is returned to the earth's surface by rain, dew, hail, snow and other forms precipitation. Precipitation refers to all forms of water that fall from the atmosphere and reaches the ground. All forms of precipitation originate in clouds. Rain is by far the most common form of precipitation, which consists of drops of liquid water. In most cases rain is formed as a result of condensation and precipitation in air that is rising that has temperatures above the freezing point.

Transpiration is the process by which plants loose water to the atmosphere via evaporation through pores on the leaves called stomata. Plants take up water through their roots and then lose some of

the water through these pores in their leaves. As hot air passes over the surface of the leaves, the moisture absorbs the heat and then evaporates into the air.

Infiltration refers to the way in which water enters the earth's surface. Infiltration is the only way in which water is made available to maintain the growth of plants and it helps to sustain the ground water supply to wells, springs and streams. The rate at which water infiltrates the earth's surface is influenced by the physical nature of the soil, soil cover referring to plants, water content of the soil, soil temperature and amount and frequency of rainfall.

Percolation is the downward movement of water through the soil and rock. This process occurs under the root zone. Ground water percolates through the soil much as water fills a sponge, and moves from one place to another along fractures in the rock, through sand and gravel, or through passages in formations such as cavernous limestone.

Surface runoff is the movement of water, frequently from forms of precipitation, across the earth's surface towards river channels, lakes, oceans, or depressions or low points in the earth's surface. This is affected by the duration of precipitation and the amount of as well as the slope of the land, soil type and the soil cover.

When rain falls to the ground, the water does not stop moving. Some of it flows along the land surface to streams or lakes, some is used by plants, some of it evaporates and returns to the atmosphere, and some seeps into the ground. As water seeps into the ground, some of it attaches to soil particles or to the roots of plants just below the surface. Water that is not used by plants travels further into the ground empty spaces or cracks in the soil, sand, or rocks until it reaches a layer of rock through which water cannot easily move. The water then fills the empty spaces and cracks above that layer. The top of the water in the soil, sand, or rocks is called the water table and the water that fills the empty spaces and cracks is called ground water.

Water is essential for all plants and animals to survive. Water is essential to life itself; without water, life on earth cannot exist. All living organisms on Earth depend on water and its unique properties for survival. Water is a prime component of cells, usually between 70 and 95% of the total mass of the cell. All this means that we are made from approximately 75-80% water by mass and some soft bodied creatures such as jellyfish are made of up to 96% water. Water also provides an environment for organisms to live in as 75% of the earth's surface is covered in water.

The earth's supply of water is steady, but over time man is able and has been able to change the way in which earth provides water. With the exponential increase in the world's population increases, rising living requirements, industrial and economic growth have resulted in greater stress being placed on the natural environment. Man activities can and have affected the quantity and quality of natural water resources available present populations as well as future generations.

Water that is used by households, industries, and farms is increasing rapidly. People demand clean water at reasonable costs, yet the amount of fresh water that is available is limited. As the population continues to increase, so will our need to withdraw more water from rivers, lakes and aquifers, in turn threatening local resources and future water supplies. Larger populations will not only use more water but will also produce more wastewater.

Domestic, agricultural, and industrial wastes, including pesticides, herbicides and fertilizers, after contaminate the earth's natural sources of water with dangerous chemicals and bacteria. Also, poor

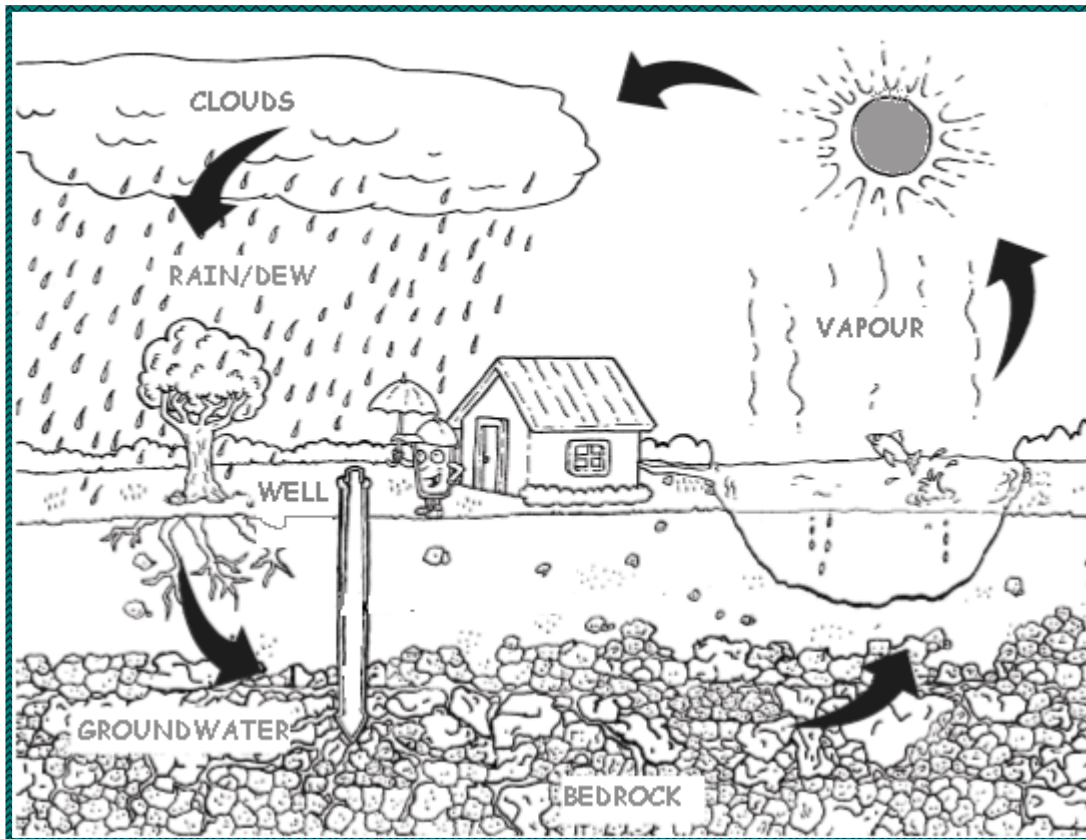
irrigation and drainage practices increase the soil salinity and evaporation rates. These factors all lead to a reduction in the water that is available that is suitable for human consumption.

Large cities have a serious effect on the local climate and hydrology. Urbanization is usually accompanied by rapid drainage of water which in turn increases the extent of floods in cities as well as in rural areas. This changes the rates of infiltration, evaporation, and transpiration that would normally occur in the environment. Together, these different effects control the amount of water being processed by the water cycle and can result in very bad results for rivers and their flooding regime, lake levels, aquifers, and the environment as a whole. All of this makes it very important that we not only learn and understand the way in which our water is made available but to also develop strategies to protect and sustain our water resources.

Activity:

Write in your own words a description of the water cycle in action in the North Rupununi. The activities of the North Rupununi should be taken into consideration.

Please use the actual names of ponds, rivers, creeks, mountain ranges and life forms found in the Rupununi in your description.



Resource sheet 3.2b Climate and weather

The weather is all around us, all the time. It is an important part of our lives and one that we cannot control. Instead the weather often controls how and where we live, what we do, what we wear and what we eat. Weather is the day-to-day conditions of a particular place. For example: It was raining today in Toka or yesterday it was sunny in Georgetown.

There are many elements of weather. These include wind, different forms of precipitation (rain, snow, dew, and fog), sunshine, temperature, atmospheric pressure, and humidity.

Climate is often spoken about at the same time and in the same manner as weather, but it is something fundamentally different. The climate is the common, average weather conditions at a particular place over a long period of time (for example, more than 30 years). We know that different places in the world have different types of climate, for example the deserts have a hot and dry climate while the Antarctic has a very cold and dry climate.

The changing climate and its effect on food and water availability, water and nutrient recycling

Global warming refers to an average increase in the Earth's temperature, which in turn causes changes in climate. A warmer Earth may lead to changes in rainfall patterns, a rise in sea level, and a wide range of impacts on plants, wildlife, and humans. When scientists talk about the issue of climate change, their concern is about global warming caused by human activities. The Earth has warmed by about 1°F / 0.5556°C over the past 100 years.

According to the World Health Organization (2008) there is now a strong, global scientific consensus that global warming is caused by different human activities primarily the burning of fossil fuels. Over the last two decades there has been an overwhelming amount of evidence collect from all over the world that show that global warming is changing rainfall and storm patterns which in turn is and will continue to disrupt environmental and ecological processes which form the bases for many livelihood activities in areas.

The greenhouse effect refers to the rise in temperature that the Earth experiences because certain gases in the atmosphere such as water vapour, carbon dioxide, nitrous oxide, and methane trap energy released from the sun. Without these gases, heat would escape back into space and Earth's average temperature would be about 60°F / 33.33 °C colder and would not be warm enough for humans to live. But if the greenhouse effect becomes stronger, it could make the Earth warmer than usual. This intensive warming of the Earth will and is causing the polar ice caps to melt. This melting of the caps will result in rises in the levels of the world's oceans.

El Niño is a climate pattern where the water in the Pacific Ocean near the equator gets hotter than usual and affects the atmosphere and weather around the world. El Niño climate conditions occur every few years, and they are not predictable.

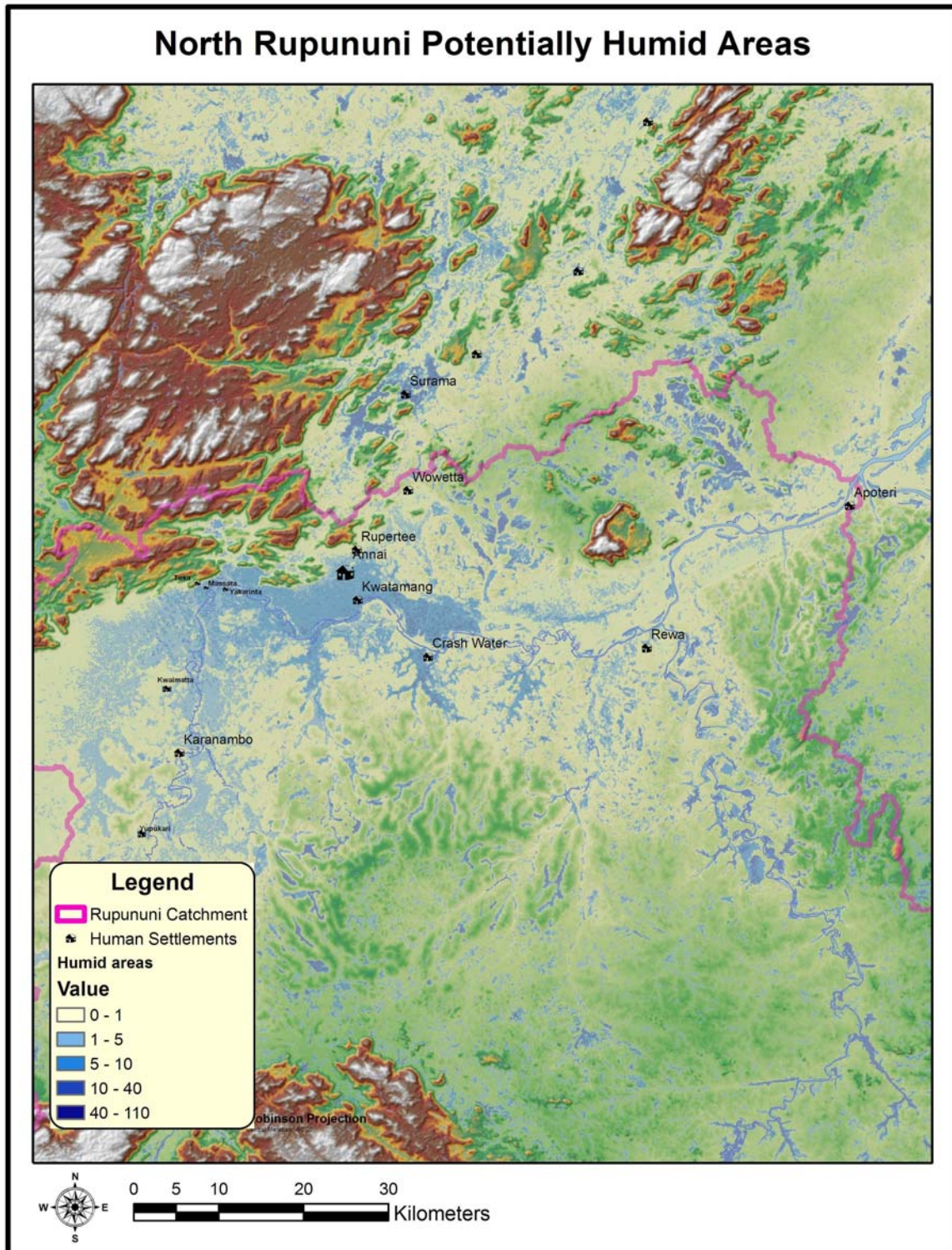
The La Niña climate phenomenon is sort of the opposite of El Niño. During a La Niña, the water in the same area along the equator gets colder than usual. According to scientists, La Niña cycles generally create a more active hurricane season in the Atlantic.

Climate change will also seriously impact health, food security, and water availability. The warming of the planet is and will lead to increasing frequency and severity of extreme weather

events for example hurricanes, droughts and floods. These events will and have been abrupt but the results are and will be sharply felt.

It is for this reason and for the continuity and survival of our livelihoods that we take these factors into consideration in planning for ensuring food security (food quantity and quality) and potable water availability.

Resource sheet 3.2c Map of the North Rupununi showing potential flooding levels



Resource sheet 3.2d Different types of soils and their characteristics

The types of soil found in the North Rupununi wetland area can be:

- saturated by permanent flooding,
- seasonally flooded, or
- occasionally covered with a small amount of water.

When wetland soils remain wet long enough, the upper soil layers are deprived of oxygen and become anaerobic (does not have nor use oxygen). Over time, this lack of oxygen results in chemical reactions that change the soil's colour, texture and what it is made up of. During the dry season when water is not present, the colour of soil can be used to identify an area as a wetland. By understanding soils and the seasonal changes in the soils, information about the duration (length) and frequency (how often) of wet season conditions can be gained.

Wetland soils are divided into either organic or mineral soils:

- i. Organic soils look like black muck or dark brown or black peat. The colour of organic soils is as a result of rotting plants and animals;
- ii. Mineral soils do not have organic material. Some examples of mineral soils are sand, silt, and clay.

Although no two soils are alike, there are roughly six main soil types:

Clay

Sandy

Silty

Peaty

Chalky

Loamy

Soils are usually a combination of these ingredients at different ratios.

Sandy soils

Sandy Soils have a gritty texture and are formed from weathered rocks such as limestone, quartz, granite, and shale. If sandy soil contains enough organic matter it is easy to cultivate, however it is prone to over-draining and drying out during the dry season, and in the wet weather can have problems retaining moisture and nutrients.

Silty soils

Silty soil is considered to be among the most fertile of soils. Usually composed of minerals mainly quartz and fine organic particles, it has more nutrients than sandy soil, and offers good drainage. When dry it has rather a smooth texture and looks like dark sand. Its weak soil structure means that it is easy to work with when moist and it holds moisture well.

Clay soils

When clay soils are wet, they are very sticky, lumpy and easily moulded but when they dry they can be as hard as rock. Clay soils are composed of very fine particles with few air spaces, thus they are hard to work and often drain poorly - they are also prone to being water logged in the rainy season. Blue or grey clays have poor aeration and must be loosened in order to support healthy growth. Red colour in clay soil indicates good aeration and a "loose" soil that drains well. As clay contains high nutrient levels plants grow well if drainage is good.

Loamy soils

This type of soil is considered to be the perfect soil; Loamy soils are a combination of roughly 40 % sand, 40% silt and 20% clay. Loamy soils can range from easily workable fertile soils full of organic matter, to densely packed soil. These soils drain well, and keep moisture and are also nutrient rich, making them ideal for cultivation.

Peaty soil

Peaty soil contains more organic material than other soils because its acidity inhibits the process of decomposition. This type of soils contains fewer nutrients than many other soils and is prone to over-retaining water. It can be made to cultivate plants well if there is proper management, in addition to the use of fertilisers and artificial drainage.

Chalky soil

Chalky soils are alkaline, usually light brown in colour, and contain large quantities of stones of varying sizes. These soils dry out quickly and usually block trace elements such as iron and manganese so that they are not available to plants. This results in poor growth and yellowing of leaves. Chalky soil is extremely poor quality and needs regular, relatively large addition of fertilizers and other soil quality improvers.

The table below indicates how to identify sand, silt and clay type soils.

Identifying Sand	Identifying Silt	Identifying Clay
<p>PARTICLE SIZE: .05 mm to 2 mm</p> <p>COMPACTION: Low</p> <p>SUSPENSION: When soil is suspended in water, sand particles will settle first.</p> <p>TEST: When moist, the sand will not form a ball when squeezed together and will fall apart.</p> <p>Sandy soils are porous and usually hold less water for plants and animals than any other soil type. Areas with sandy soils are very easily affected by erosion.</p>	<p>PARTICLE SIZE: .002 mm to .05 mm</p> <p>COMPACTION : Medium</p> <p>S U S P E N S I O N : When soil is suspended in water, silt particles will settle after sand, but before clay</p> <p>TEST: When moist, silt cannot be pressed into a ribbon.</p> <p>Silty soils hold both nutrients and water, which in turn can make them good soils for plants to grow. Areas with silty soils are very easily eroded by wind and water</p>	<p>PARTICLE SIZE: Less than .002 mm</p> <p>COMPACTION : High</p> <p>SUSPENSION : When soil is suspended in water, clay particles are generally the last to settle</p> <p>TEST: When moist, clay can be pressed into a strong ribbon.</p> <p>Clay soils are not very good for plants to grown on, as because of the closeness of clap particles, roots are harder to grow. Areas with clay soils can be more eroded easily.</p>

Resource sheet 3.2e Datasheets for raindrop activity

NRAMP Community Course Scenario 3

Activity 2 Data Sheet

GROUP NAME: - _____

Participant _____

SOIL	NUMBER OF RAIN DROPS
------	----------------------

PLANTS	NUMBER OF RAIN DROPS
--------	----------------------

RIVERS	NUMBER OF RAIN DROPS
--------	----------------------

PONDS & LAKES	NUMBER OF RAIN DROPS
---------------	----------------------

GROUNDWATER	NUMBER OF RAIN DROPS
-------------	----------------------

Rain Drop map where you go! Using arrows show your path along the five different places/locations.

SOIL

PLANTS

PONDS & LAKES

RIVER

GROUNDWATER

GROUP NAME: _____

LOCATION	RAINDROP A	RAINDROP B	RAINDROP C	RAINDROP D	TOTAL
PLANTS					
SOILS					
GROUNDWATER					
RIVERS					
PONDS & LAKES					

Which location received the most raindrops? _____

What is the average amount of raindrops at the following locations;

PLANTS: _____

PONDS & LAKES: _____

Which location received the least raindrops? _____

List the locations according to the highest number of raindrops

1. _____

2. _____

3. _____

4. _____

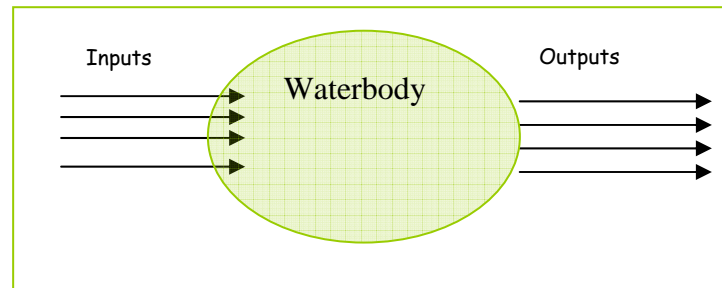
5. _____

* Each group member is a raindrop.

Resource sheet 3.3 Monitoring of water attributes

There are many attributes of a waterbody with regards to the hydrology which can be monitored. Hydrological inputs and outputs refer to how and where the waterbody gets water and loses water. These are the possible hydrological inputs:

- 1) Groundwater discharge refers to water that comes up from below the earth's surface from the water table;
- 2) Surface runoff refers to water that flows off of the earth's surface into the waterbody;
- 3) Surface over bank inundation (flooding) from a river or from a rise in water level of a waterbody refers to water that flows into one waterbody from another;
- 4) Precipitation refers to rain, and or dew.



These are the possible hydrological outputs:

- 1) Evaporation refers to water that is lost from the surface of the waterbody as vapour;
- 2) Transpiration refers to water that is lost from the waterbody, as plants take water up via their roots for processes of photosynthesis (food making), then giving water off as a waste product to the atmosphere;
- 3) Groundwater recharge refers to water that is returned from above the earth's surface into the water table;
- 4) Surface runoff refers to water that flows out of the waterbody into another.

The hydrological inputs and outputs for a site can be a combination of all the listed inputs or a few of those listed.

Flooding Regime refers to the presence or absence of water in the waterbody. There are two options:-

Water Present

Water Not Present.

Water Colour refers to the colour of the water in the waterbody. Water colour can be recorded as black, white, clear or brown (see diagram below).



Showing an example of Black Water

Showing an example of White Water

Showing an example of Clear Water

Showing an example of Brown Water

The characteristics of water are used to indicate the quality of water. The water quality indicators can be grouped as:

- 1) Biological: macro-invertebrates, bacteria, and algae;
- 2) Physical: temperature, turbidity and clarity, colour, salinity, suspended solids, dissolved solids;
- 3) Chemical: pH, dissolved oxygen, biological oxygen demand, nutrients (including nitrogen and phosphorus), organic and inorganic compounds;
- 4) Aesthetic: odours, taints, colour, floating matter.

Measurements of these indicators can be used to determine, and monitor changes in, water quality, and determine whether the quality of the water is suitable for the health of the natural environment and the uses for which the water is required.

Water quality is usually measured using meters. These meters can record the pH (acidity or alkalinity), the turbidity, and dissolved oxygen, of the water. These values tell how healthy the water is to sustain life. However, the meters to record these values are usually very expensive.

An alternate approach is biological monitoring that would provide information on the health of the water body based on the presence and/or absence of small invertebrates. This method involves the identification and classifying of invertebrates into groups. This method of aquatic monitoring gives a rapid assessment of the water quality and habitat parameters within the system. The difference and the quantity of macro-invertebrates can then be used to understand the quality of the water body.

Macro-invertebrates that are important in monitoring the water quality include aquatic insects, and other arthropods that live in different habitat types within the water body. Most of these organisms derive their oxygen from the water in addition to a minimum quantity of air. Macro-invertebrate sampling allows for impacts both natural and artificial to be recognized, so that actions, if possible, can be taken to remediate the situation.

Macro-invertebrate sampling shows effects of both short and long term impacts, as most life cycles of such invertebrates range from one year to several. Macro-invertebrates can be found within many kinds of habitats including places where shallow water flows quickly over rocks, accumulated leaf litters, roots hanging into the water, old wood or logs, and the streambed.

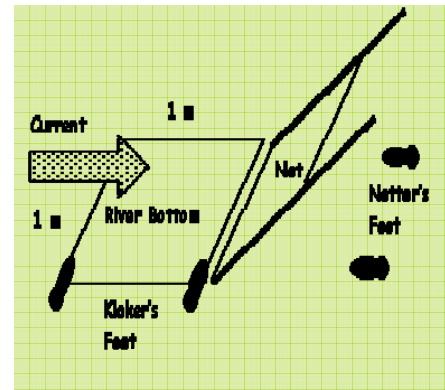
The procedure that can be used to conduct this macro-invertebrate monitoring has a number of stages as follows:

1. Selecting sampling areas – there should be at least three areas selected within the wetland site that is being monitored for macro invertebrate sampling. These areas should include areas that will allow for the examination of the bottom substrate, woody debris/vegetation at the edge of the waterbody and for waterbody surface examination. The same areas should be sampled at each visit to the site that is being monitored.

2. Sampling areas – there are a number of techniques that can be used for sampling including:



i. Bottom substrate sampling - within sites selected look for an area where the water is about 3 - 12 inches. Begin by placing a net in a location downstream from where a team member is standing. The net should be firmly placed into the streambed, securing the bottom edges with rocks. The net should also be attached to a stick that another team member should hold to keep it secure. Then the team member upstream from the net should begin kicking the upper layers of substrate in the water to dislodge any invertebrates. The duration of this should be for three-four minutes. Any loose debris should be rubbed off rocks, and sticks caught so that most invertebrates will be collected off the sticks into the seine. After doing this the net should be lifted out of the water, being careful not to lose any of the debris containing macro invertebrates caught in the net. Rocks and sticks found should be examined thoroughly for invertebrates before being discarded.



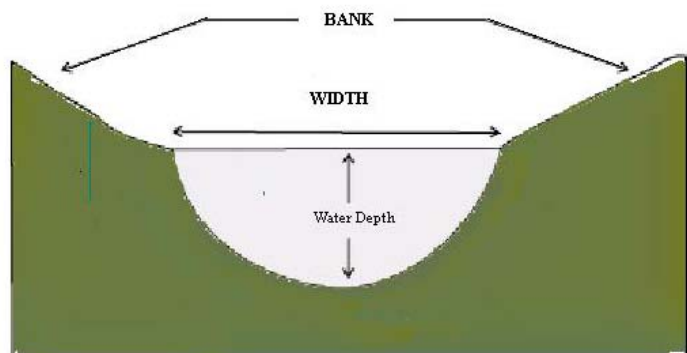
Showing Kick sampling methodology

ii. Water surface sampling - within the monitored site, select an area of the waterbody where a dip net is taken and the top 20 cm on the water surface is sampled for any invertebrates that might be present on the surface of the water. The area to be sampled should be 1m x 1m. The time spent doing this should be between three to four minutes.

iii. Woody debris/vegetation sampling - at the waterbody being monitored, a 1m x 1m area of vegetation on a bank of the waterbody should be sampled. This area can be sampled by shaking the branches of the plants with a dip net and collect any macro invertebrates that might be on the vegetation. Stems and branches should also be examined for the cases on invertebrates that might have already completed metamorphosis. Additionally, six handfuls of old decaying leaves found next to rocks or logs in this same area should also be collected and added to the sample. The time spent doing this should be between three to four minutes.

Upon completion of sampling of each of the three areas within the site, the team should spend not more than thirty minutes going through the samples, to identify and record the macro invertebrates caught. The samples should be separated for accurate identification of macro invertebrate type.

Water Body Features - This refers to the water depth, water body width, water body length, of the water body. These observations must be made and recorded in the morning and the afternoon when the site is being visited for data collection. These will allow for an understanding of how the water level fluctuates over the year.



Showing waterbody width, depth and banks

i. Water depth data should be collected in keeping with the following guidelines:

- a) One spot chosen to collect water depth data throughout the year. This spot should be accessible in the dry and rainy/flood season;
- b) Water depth readings should be taken morning and afternoon per site visit using meter as the unit of measurement.

ii. Waterbody width measurements should be collected at the same point of the water body at each visit to the site.

For the purposes of monitoring, waterbody width refers to the distance covered with water from one bank to the other.

iii. Waterbody length refers to the distance along any one of the banks in metres.

In the case of the rivers and creeks, where a distance of 1km is selected to be monitored, the waterbody length will be 1 km – even though the distance of the waterbody might be longer than that.

Resource sheet 4.2 The Amerindian Act - village councils and rules

According to the Amerindian Act of 2006, the village council comprises of elected members of the community. The number of members on the village council is directly related to the number of persons living in the village.

The breakdown of the number of councils according to the population of the village is as follows. For a village with a population of less than 600 villagers the minimum number of councillors that shall be elected is 6 and the maximum number of councillors that shall be elected is 12. For a village with a population of more than 600 villagers but less than 2000 villagers, the minimum number of councillors that shall be elected is 8 and the maximum number of councillors that shall be elected is 16. For a village with a population of more than 2000 villagers, the minimum number of councillors that shall be elected is 10 and the maximum number of councillors that shall be elected is 22.

According to Chapter 13 of the Amerindian Act, the functions of the village council are to:

- (a) represent the Community;
- (b) act in the best interests of the Community;
- (c) provide advice and strategic direction to the Community;
- (d) provide for the good governance and development of the Community;
- (e) hold for the benefit and use of the Community all rights, titles and interests in or over Community lands;
- (f) manage and regulate the use and occupation of Community lands;
- (g) promote the sustainable use, protection and conservation of Community lands and the resources on those lands;
- (h) encourage the preservation and growth of Amerindian culture;
- (i) ensure that places and artefacts located which hold sacred or cultural values to the Community are protected and cared for;
- (j) protect and preserve the Community's intellectual property and traditional knowledge;
- (k) nominate Councillors or other members of the Community to accompany the Toshao to meetings of the Regional Democratic Council or to attend other meetings on behalf of the Community;
- (l) ensure that proper accounts and financial records are properly kept.

(2)A Village Council may assign tasks but may not delegate its functions to any other person. Subject to the other provisions of the Amerindian Act, a Village Council may, in the exercise of its functions, make rules governing:

- (a) qualification as a resident;
- (b) the occupation and use of Community lands;
- (c) access to sites of sacred or cultural significance;
- (d) the management, use, occupation, preservation, protection and conservation of Community lands and resources or any part thereof;
- (e) the protection and sustainable management of wildlife including restrictions on hunting, fishing, trapping, poisoning, setting fires and other interference with wildlife;
- (f) the development and regulation of agriculture;
- (g) the control, maintenance, protection and use of water supplies including the construction and regulation of wells which are owned by the Community or for which the Community is responsible;
- (h) the construction and maintenance of roads, bridges, ditches, fences and other local works;
- (i) the construction and maintenance of sewerage systems and other sanitary facilities;

- (j) the regulation of the conduct of non-residents when within Community lands;
- (k) maintaining discipline, good order, the prevention of disorderly conduct and nuisance;
- (l) the granting of permission for business or trade on Community lands;
- (m) subject to the law governing intellectual property, access to research into and recording and publication of intellectual property and traditional knowledge which belongs to the Community;
- (n) the certification of products made by residents using traditional methods;
- (o) the voting procedure in a Community general meeting;
- (p) any other matter which falls within the functions of the Village Council.

(2) A Village Council may impose a fine of nineteen thousand dollars for the breach of any rule made under subsection (1).

A rule, and any amendment to a rule, made by a Village Council comes into effect when:

- (a) the Village Council has consulted the Community in general meeting and two-thirds of the members of the Community general meeting have given their approval; and
- (b) the rule has been approved by the Minister and published in the Gazette.

Resource sheet 5.2 Tourism initiatives in the North Rupununi

The North Rupununi is made up of sixteen communities. These sixteen communities have formed themselves in a body known as the North Rupununi District Development Board (NRDDB) of which the North Rupununi Tourism Programme is an entity. During a special meeting held on 28th February 2004 at the Bina Hill Institute, tourism service providers, local communities and Iwokrama decided to form the North Rupununi Tourism Association. The purpose of the meeting was to share information about tourism, exchange perspectives on future prospects, strengthen partnerships, and chart and agree on a way forward for North Rupununi Tourism. The meeting was attended by Iwokrama, Rock View Lodge, Karanambu Ranch, and the community tourism enterprises of Surama, Aranaputa, Rupertee, and Wowetta villages.

Surama Eco lodge

A new eco-lodge that indicates the nine different Amerindian tribes of Guyana, a playground for recreation purposes, with over five years of Ecotourism experience, the community of Surama is creating new avenues for economic benefits for people of the community.

Wowetta

The Wowetta Cock of the Rock eco tourism conservation nature trail offers tourists the opportunity for tourists to observe the charismatic Guiana Cock of the Rock and its lekking behaviour. Wowetta is one of the five Amerindian villages within the Annai sub-district, with a population of about 235 people of mixed Makushi/Awarak tribe.

Rupertee

The Rupertee Eco Tourism Nature Trail is another community tourism initiative. This tourism product is used primarily by tourists that visit the Rockview Lodge. Rupertee is another community within the Annai sub district, with a population of about 240 people.

Aranaputa

The Eco Tourism Nature Trail and rest cabin is located within the heart of Aranaputa Village which is a mixed coastlander-Amerindian community. Approximately 80% of the 450 population are indigenous.

Rockview Lodge

Rockview Lodge is located at Annai, a small Amerindian village on the main road to Lethem. It comprises of an old ranch-house (now the family home), and several self contained lodges. The lodge is run locally by Colin Edwards, who is an ex-patriot who stayed on after doing VSO in the 1960s in the North-West. The resort is constantly undergoing expansion and improvement to meet the needs of all tourists of varying income brackets.

The Iwokrama Canopy Walkway

This is located in the Iwokrama Forest, and was officially opened on 22 November 2003. Over 100 people of all ages gathered for the ceremony and inaugural walk. The canopy walk is a series of suspension bridges and decks of up to 30 meters in height. It gives visitors a new view on the forest and allows wildlife to be relatively free from human intrusion. The walkway is a significant sales feature for tourism development within the region. The unique walkway construction allows trees to grow normally by using adjustable cables and braces throughout the support structure. This walkway is being managed by a group called CATS (Community and Tourism Services Inc). This group is comprised of the Iwokrama International Centre, the community of Surama, Rockview Lodge and Wilderness Explorers. The concept behind this type of management is to include all

levels of stakeholders in the management of this tourism entity that is found in an area that has been and is being used communally by the people of the North Rupununi Wetlands.

Karanambu Eco lodge

The 125 square miles of Karanambu is the home of Diane Mc Turk, who is well known for her success in re-habilitating giant river otters into the wild. The McTurk family (Diane's nephew Edward and his wife Melanie now run the tourism side of operations). This lodge nestled alongside the Rupununi River has long welcomed visiting naturalists to see the giant otters and the giant *Victoria amazonica* lilies, which are the largest in the world.

Rewa Eco lodge

The village of Rewa is all set to move forward with its tourism venture. The village now has three eco lodges, which were built through the support of Conservation International its Community Investment Fund (VCIF). The lodge has boosted the village capacity to host visitors and after its opening the village was able to secure complete booking for four months in a row. The lodge proved invaluable to the Canadian team that was in the region exploring for petroleum. The village was able to capitalize on the needs of the team and the lodge earned a significant amount of money, which will go towards the village and the upgrading of the lodge and skills of the employee. The village has also started to examine the possibility of expanding into river tours and other activities that will pull visitors to the area. They have already established a partnership with the Rock View eco-lodge and expect to see more visitors to the area.

