

## **THEME**

### **MARINE LIFE MONITORING AND PRESENTATION.**

Kenya has a coastline of about 500km which is very rich in marine life both animal and plant. This marine life is under threat due to various predators including:-

- Overfishing.
- Marine plant harvesting.
- Oil spills and other pollution.
- Imbalance in natural selection.

### **INTRODUCTION**

Marine life in Kenya's coastline is nature woulder as there is a very large variety of species of plants and animals' conservation is for the purposes of ecological balance to marine life as well as economical purposes including tourist and controlled and sustainable harvesting of precious and high value products and by products of this marine life.

To be able to implement sustainable (effective/conservation) measures appropriate monitoring and sensing systems need to be put in place. One solution is the use of Nano satellites place at appropriate position so as to capture the events on the coastline and also determine position of sea animals by use of selected sensors.

### **OBJECTIVES**

- To analyze the extent of marine life degradation.
- To outline the processes of degradation destruction.
- To come up with programmes on how to minimize this degradation.
- To design Nano satellite system which can be used for monitoring the marine life and also used in processes or programs that will be used in alleviating this degradation.
- To design cansat or bottle sat system with capability to monitor marine.
- To develop subsystems including signal transmission and reception signal processing system management subsystem.
- To acquire equipment and other resources required to develop the different subsystems.
- To train students, technicians and lectures on Nano satellite development techniques, procedures and methodologies.
- To hold workshops, seminars, exhibition and contests on Nano satellite systems.

### **TECHNICAL SPECIFICATIONS**

Range from earth surface 100m-80km

Coverage-20km into land and 50km into sea of Kenyan coastline

Resolution-1m<sup>2</sup> for observation

Data rate-upto 2mb/sec

## Other

Compatibility with mobile devices (sensors) planted on sea animals

Mass 8kg cansat system

Volume radius 80mm (max) Length 200mm (max)

Orbits 2km-100km

## JUSTIFICATION

It is necessary to have a comprehensive programme to conserve marine life in Kenyan coast so as to be able to maintain ecological stability and environment balance to alleviate destructive effects associated with marine life destruction and environmental degradation.

A Nano satellite based system will there be very appropriate as a monitoring tool for gathering data on the conditions of the different entities of interest. It will also be used to gather data on effectiveness of the methods employed in conservation

The Nano satellite system is achievable with appropriate structures in place. One main objective of this mission idea is therefore to have the structures and resources especially human in place. Once in place the programme can then be implemented in a initial pilot project. Other technical aspects of project implemented will be carried out by student and lectures who will be involved in consat and bottle sat projects (academic or innovation)

## PROJECT PLAN

Duration 2 years **March 2011-feb 2013**

### **March 2011- Sept 2011**

Materials and personnel acquisition and setting up work environment

Task allocation and detailed project plan preparation

### **June 2011-Sept 2011**

Detailed technical specification of payload

### **Sept 2011-Dec 2011**

Detailed launch path specification

Analysis of subunits for satellite system payload and communication link

### **June 2012-Sept 2010**

Detailed design of launch path and specification of launch path and specification of launch equipment

Detailed design of sensor system and associated data acquisition and transmission system

Testing of various links

**Sep 2012 -Dec 2012**

Integration of circuits and other electronic and communication system

Trial launches

**Jan 2013**

Final report and submission of design

**REQUIREMENT**

**EQUIPMENT, TOOLS AND COMPONENTS**

- Laboratory with equipment to design, develop and fabricate the pilot satellite system.
- Software for simulation processing information and data.
- Electronics components, circuits and toolkits to assemble sensor and transmitter circuits.

**HUMAN RESOURCE**

- Marine Environment wildlife experts.
- Remote sensing, GPS experts.
- Electronic/telecommunication/software engineers.

**FINANCIAL REQUIREMENTS**

|    |   |                        |  |
|----|---|------------------------|--|
| 1  | Secretariat setup and maintenance               | US \$ 100,000          |  |
| 2  | Office equipment and maintenance                | US \$ 100,000          |  |
| 3  | Seminars ,Meetings and Workshops                | US \$ 40,000           |  |
| 4  | Communications, local and international travel  | US \$ 80,000           |  |
| 5  | Payload subunits design and specification       | US \$ 50,000           |  |
| 6  | Link analysis design and specification          | US \$ 40,000           |  |
| 7  | Sensor system analysis design and specification | US \$40,000            |  |
| 8  | Launch path analysis, design and specification  | US \$ 40,000           |  |
| 9  | Test equipment acquisition                      | US \$ 250,000          |  |
| 10 | Material and manufacture equipment purchase     | US \$ 250,000          |  |
| 11 | Regulatory fees and other expenses              | US \$ 10,000           |  |
| 12 | Launch and other tests                          | US \$ 1,500,000        |  |
|    | <b>TOTAL</b>                                    | <b>US \$ 2,500,000</b> |  |

## METHODOLOGY

a) The engineering design, development and fabrication part will involve the following stages

- Detailed system concept.
- Detailed system interaction documentation.
- Module specification and design.
- Module development.
- Module fabrication and testing.
- System integration and overall testing.

### **b) System deployment (satellite launch)**

This will involve detailed design of the launch path with all associated parameters

When the designs are ready simulation will be done using appropriate simulation tools for the different aspects of the system

Appropriate modification alternatives and categories of the whole system or subsystem will be formulated implemented and deployment in the simulation system.

### **c) Envisaged use**

As well as the core use in monitoring and gathering data on Kenyan coast marine life

The project will involve composite various work groups of multidisciplinary researchers, professionals, lectures and students. This will enhance linkages between industry (organizations that will actual use the satellite system when ready) universities and other stakeholders. It will provide opportunities for researchers and project student to base their projects on real systems that can be implemented in the country hence giving the hands on experience .It will enable the country have a think tank on satellite systems and their applications increasing know base and resource and also contributing to the international community.

It will provide other solution to problem s associated with environmental degradation and natural resource enhancement.

It will provide market for innovation products by student and researchers at universities and polytechnics.

## WORKSHOPS, CONFERENCES, MEETINGS

Since the project will be a multidisciplinary team involving marine, environment experts, remote sensing experts, space science experts and

Engineers(Electronic,Telecommunications,computer,mechanical)

A number of workshops will be required to:-

- Enlight other experts on the procedure,requirements,practicals regulations and standards in a particular experts field of specialty
- Brainstorm and generate a project plan with clearly defined tasks for each expert and relationship with others
- Identify risk in the project and come up with mitigation strategies
- Generate detailed system concept and block diagram for each unit(module)of the project and determine very specific ;requirement in terms of tools,equipment,software etc

**Conference to:-**

- Present papers of findings and are relevant to the project
- Attend presentation by peers in other country ;so as to enrich the experts in their fields of specialty

**TRANSPORT AND LOGISTICS**

Transport and communication funds/facilities will be required both at the concept development and specification stage and also at the system design, development, simulation and implementation stages for personnel (experts) since they work in different locations in the country.

It will also be required for sourcing/procurement of various items such as equipment, softwares, and electronic components.