

# National Biomass Resource Assessment Program

Combustion Gasification Propulsion Laboratory  
Indian Institute of Science

## Background

- MNES has conceptualised an approach to generate the bioresidue map of India in 1997.
- Consultants were commissioned to generate data on biomass production, utilization, and therefore excess biomass for power generation.
- Phase I (a, b) involved 150 taluks (75 +75); phase II involved 350 taluks.
- In each segment there were internal reviews and with experts and the objectives took appropriate course corrections - there were improvements in the nature and quality of data acquisition and presentation.
- Phase I b involved a two level approach in which there were Apex institutions who were required to work with consultants, consolidate the work and provide interface to MNES.
- To examine in depth the current efforts, a project was given to IISc to examine fifty reports and consolidate them into a presentation package appropriately to enable wide dissemination.
- Phase II was to be initiated when IISc was brought in as NFP to integrate and coordinate the generation of national level database and presentation package.

## The following features were noted from the reports:

- The quality of reports varied widely - some were satisfactory and others poor.
- Phase I reports, particularly from Tamilnadu and Gujarat seemed presented better allowing easier assimilation of data by readers.
- Even if one or two more phase/s of study by consultants was/were provided for, it would not be possible to cover the 5000+ taluks.

- Biomass productivity data, particularly the agri-crops are annual and will change depending on the choice of crops, rainfall, etc. and for the data to be useful, the changing productivity should be accounted annually or biannually.
- The project was executed in a limited sense with fifty reports several of which could not be used, for they did not have adequate information.
- Discussions with Apex institutions and MNES and some select group of consultants on issues of accuracy of crop residue, crop ratio estimates and on standardising the format for reporting (for Phase II) were made.
- The standardised format, electronic transfer of data for further processing (in addition to hard copy) have now been implemented after suitable discussions with all concerned.

### Work Completed On The Earlier Project

- Critical assessment of the earlier reports, creation of new formats.
- Development of the software for biomass assessment in stages, with each stage examining how much of what is being done can be generalised - learning the possibility of RRSSC's involvement in contribution in enhancing the data collection for the biomass production all over the country and the need for a subtler strategy for estimating the bioresidue use in various forms in the rural environment.
- Demonstration of the software that is nearing completion, with data covering the complete Tamilnadu (a total of about 175 taluks, 56 currently completed), with detailed information at village level for 11 taluks and summary data for the rest (the summary data provided partly by Sri. Sankara-narayanan, TEDA) - will be presented by Dr. N K S Rajan later.

### Approach to the New Project

#### 1. Role of IISc

- To act as a National Focal Point as regards to the biomass availability for power generation.
- To interface and work with RRSSC to acquire the information on biomass productivity, its validation through data acquired from biomass

assessment studies made by consultants and verified by Apex Institutions.

- Acquire information on the availability of agro-industrial residues; particularly rice husk, groundnut shells, etc through sources like industrial handbooks and others.
- To develop specific models with regard to biomass use as domestic fuel, fodder, roof, etc and improve them with inputs from other studies (like those of NCAER) and thus make better estimates of bioresidue use by the society.
- To produce active documentation on the power generation technology at small and large power levels, the economics with regard to investment and cost of energy, provide the guidelines for financial packaging, environmental regulations and any other advice that may be requested from time to time.
- To set out this information base distributable on CD's and also set out another information base as web package to be deployed at the option of MNES with necessary access security and provide options for information exchange.
- This feature of information exchange would also be the information bridge between IISc and RRSSC during development.
- IPR protection on these packages developed could be arranged with operations permitted through a controlled procedure with documentation by MNES.

## **2. Role of RRSSC**

- To generate biomass production information base through remote sensing, validate the imagery with the ground truth obtained from biomass assessment studies and other data that may be available in agricultural ministry or other sources.
- To generate GIS information base for further integration at IISc.
- To work with IISc in data interface compatibility and the other aspects of dynamic documentation.

## **Experiences in Data Collection**

## Data required are

- Taluk level maps for any/all identified taluks over India.
- Agricultural outputs of all taluks should be available (forest related information is less important since forests are not expected to be source of fuel for electricity).
- Authorities contacted were: Survey of India (Dehradun, Hyderabad and Bangalore), National Informatics Centre (NIC), Bangalore, Central Bureau of Irrigation and Power (CBIP), New Delhi, Census of India, New Delhi, Chennai and Bangalore. Data availability is neither straight forward nor information on availability widely known.
- Apparently, digital maps are being produced now. While a number of private vendors can provide maps for limited areas, the general suggestion from Census Board was not to go in for these unauthenticated sources. Hard copy maps are not available for all the (unrestricted and others) zones even now (out of print or other reasons). It is being suggested that these problems would be overcome in another six months.
- Information on agriculture output districtwise is available. But talukwise is yet to be available. The importance of these inputs is fortunately reduced in the new dimension of RRSSC's involvement.

## Issues on Tools of Information Management & Strategies of Project Implementation

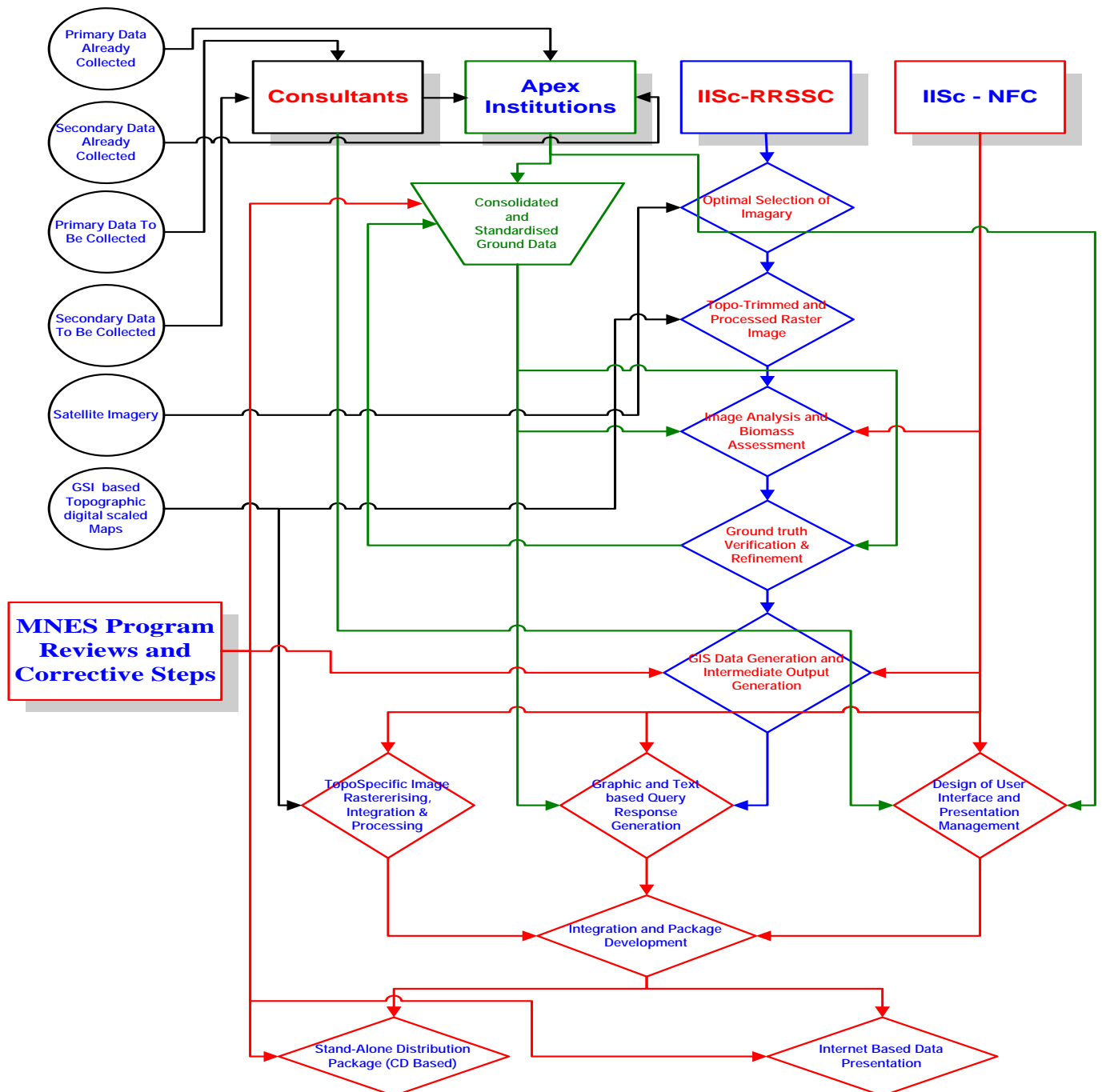
- The strategy for the package development requires consider the following points:
- The applications developed should be useable on the most commonly available platform, at least a medium class (if not the entry level) desktop or notebook computers, of the prevailing standards of the technology.
- It is desirable that the end users should be able to use this application in truly "stand-alone" mode, rather than with bundled third party modules that need purchase or licensing of them by the end user.
- It is known that the presentation of the information under discussion needs GIS techniques for an effective integration and management of the data.

- It is also known that most of the commercially available GIS development packages neither have a common standard nor have license-free redistributable modules for deployment of the package developed as envisaged - though, the tools available are adequately powerful for the tasks considered.
- Of late, a few GIS development tool kits are known to be available with limited resources and capabilities and also with freely redistributable modules for application development.
- However, the utility of these tools needs to be assessed with regard to their cost and it is to be decided whether or not to go in for them. Alternately, suitable GIS modules would be written in-house to meet the requirements and the final packages would be completed as envisaged.
- Suitable queries will be designed (dynamic as well as pre-computed) as a part of the package and appropriate response screens with graphics and texts will be presented that uses GIS and other tools.
- It is important to note that the package under consideration is to focus the potential of the biomass resources in any selected area or to provide a suggestive operational zone for biomass based power generation - rather than being looked upon as a Land Information System or as a territorial reference map. It is more intended for complementing the physical field survey. It is not a replacement for direct field survey.
- Keeping these aspects in mind, it is intended to embed only essential GIS and other tools into the package that are required for a proper illustration of the information sought, optimizing the computer resource demand allowing for faster response on use.
- The package will have two operating versions. One, with an unhindered data and information flow for the user to arrive at the first-cut data, to be used in a desktop PC and distributed on CDs.
- Second is to be made available on the Internet with layers of information, for a quick scan and for a preliminary investigation on these issues, but with limited illustrations and queries in order to optimize the web-time requirement as well as to allow to work on a optimally configured web-server. This approach has the advantage of providing a wider accessibility allowing direct user interaction.
- During the time of the package development and its initial stage of implementation, it is essential to have the Internet development and test platforms at IISc that require incremental investment to its existing facilities at CGPL. This will enable meeting the critical need of data

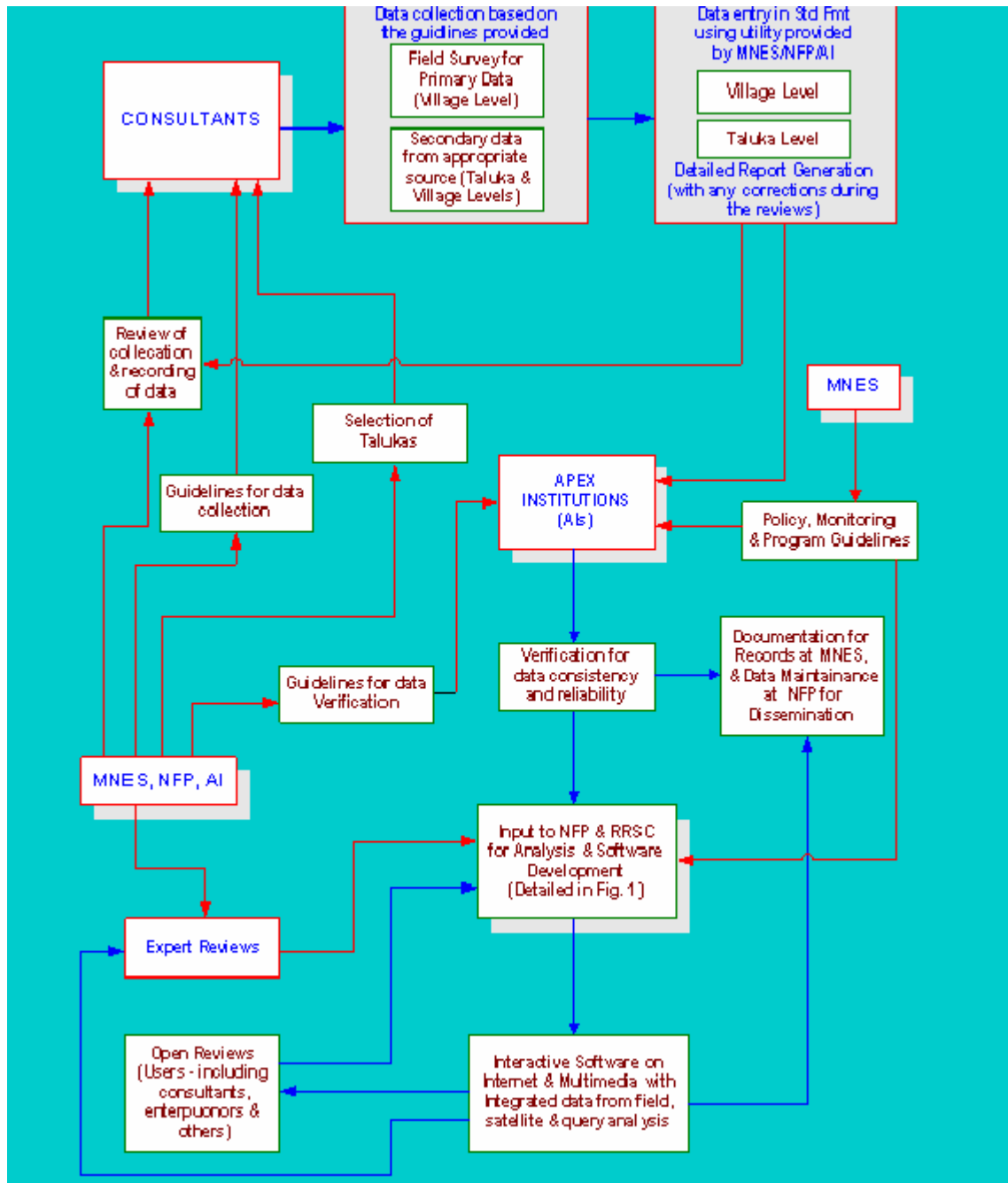
exchange between IISc, RRSSC and other organizations. The IPR policies, location of a suitable web-site of the choice of MNES can be brought into operation when this work is complete.

- Taking into account of the guidelines MNES has set on the role of NFP, a functional flow chart of the activities involving IISc and consultants, AIs as well as IISc and RRSSC are worked out in two flow charts.

### NFP Activity focusing IISc-RRSSC Interactions



## Flow Chart with an emphasis on the Collection of the Data from the Field



## Concluding Remarks

- The work under NFP proposed is to generate a integrated package with a single window approach for the information on Biomass Resource Assessment at the national level.

The work involves three parts:

- First part is survey and study at limited and selected places carried out by the Consultants & AIs, and is complementary to this proposal
- The Second part of the work is in generating data for biomass production on the national level taking ground truth verification from the studies made by consultants - to be carried out by RRSSC, and is part of this proposal.
- The third part of the work involves modeling for biomass utilisation and generation of integrated package with embedded knowledge that allows an end user to get a close approximation in deciding on a biomass based power generation scheme - to be carried out by IISc as NFP and is the main theme of this proposal.