A Presentation

On

Land Use Planning in Gujarat State

Government of Gujarat
• Taking the State as a single unit to take care of connectivity / relation of various sectors of development.

• All sectors dependent on land should be addressed for planning simultaneously.

• Representation and details of database at 1:5000/10000 scale

• Aggregation to required administrative and Natural Hierarchical units through a software mechanism

• Segregation to individual parcel (Survey No.) through linkages of digitised village maps.

• Geo-referencing and superimposition of various thematic layers

• Criterion based analysis and Modeling to arrive at proper landuse

• Atlases with Detailed Depiction and Explanation for thematic maps and plans
Geo-spatial database: Conceptualization & creation

Satellite Image Geo-referenced through GPS measurements

Seamless mosaic
Rural GIS: Village maps (1:5000) superimposed on seamless mosaic of satellite data. This layer has been used as base map.
### Soil Health Card - District: Amreli Taluka: Amreli Village: Gavdaka Survey No: 18

<table>
<thead>
<tr>
<th><strong>Karmee Aadeya Pargani Virato</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rajstani Samajy Mahili</strong></td>
</tr>
<tr>
<td><strong>Subhagal Number</strong></td>
</tr>
<tr>
<td><strong>Subhagal Vars</strong></td>
</tr>
</tbody>
</table>

1. **Name**: Amreli 
   - **Taluka**: Amreli 
   - **Village**: Gavdaka 
   - **Survey No**: 18

2. **Mother Name**: Amreli 
   - **Husband Name**: Amreli

3. **Address**: Amreli, Gujarat

4. **Date of Birth**: 
   - **Age**: 30

5. **Date of Registration**: 2015-01-01

6. **Latitude**: 23.5
   - **Longitude**: 72.3

7. ** Soil Health Card Details**
   - **PHI**: 090915

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### Validation Report

<table>
<thead>
<tr>
<th><strong>Item</strong></th>
<th><strong>Rate</strong></th>
<th><strong>Permissible</strong></th>
<th><strong>Permissible Standard</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. P.I. &amp; P.V. (Karmee Parihata)</td>
<td>7.80</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>2. PH. SI (K.V. Shala) (P.V.Srama/Meter)</td>
<td>0.56</td>
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<td>❌</td>
</tr>
<tr>
<td>3. Saniyay Abhen (TDA)</td>
<td>0.78</td>
<td>❌</td>
<td>❌</td>
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<tr>
<td>4. Lakshy Sankar (Kg., Meter)</td>
<td>45.60</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>5. Lakshy Potha (Kg., Meter)</td>
<td>345.84</td>
<td>❌</td>
<td>❌</td>
</tr>
</tbody>
</table>

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### Micro level Planning
Cadastral–level Available Phosphorus Status: Gavadka Village, Amreli Taluka
3-D images for entire state generated using IRS stereo data
Geo-spatial database: Conceptualization & creation

Road Information System

Irrigation GIS

Check dam Information System

Mining Information System
Geo-spatial database: Conceptualization & creation
Geo-spatial database: Conceptualization & creation
Population, Household Size, Male Female Literacy

Displaying demography (Variable Quantities) across villages

Data Source: Census of India 2001
Standardised datasets integrating natural, man made amenities at various levels of different hierarchy.

**VARIOUS HIERARCHIES**

- Administrative
  - District
  - Taluka
  - Panchayat
  - Village
  - Survey No.
- Political
  - Parliamentary Assembly
  - Panchayat Constituency
- Resource Administration
  - Circles
  - Division
  - Subdivision
  - Sector
- Natural
  - Thematic Levels Scales

**CONNECTIVITY ACROSS DEPARTMENTS**
Various Datasets Created for Planning and Decision Making

- Landuse
- Topography
- Hydrology
- Vegetation
- Soil
- Administrative Boundaries
- Infrastructure – Transport & Communication, Canals, Water Supply, Power, Gas, etc.
- Ownership Details
- Socio-Economic Facilities
- Legal Acts and Frameworks
- Environmental Map
- Technical Feasibility for Particular use
- 100s of layers

Datasets are: STANDARD, COMPATIBLE, EASILY RETRIEVAL

These Datasets can be used to derive: NEW DATASETS AND LAYERS

Above is done at BISAG through collaborative efforts.
## Baseline Study

### Data Collection and Compilation
- Satellite Data
- Thematic Layers
- Collateral Data

### Inventory and Mapping
- Government Plans
- And Future Vision
- Research Based
- Development Model
- Legal Framework

### Analysis
- Identification of Criteria for Analysis
  - Place Based
  - Time Based
  - Condition Based
  - Environment
  - Social
  - Economic

### Quantification of Impacts

### Identification of:
- Issues
- Proposals
- Strategies

### Review Workshops - In collaboration with concerned Sector
- Review/ Plan of Action - Workshops
- Issues
- Sufficiency of data
- Resolution
- Parameters/criteria used
- End to End Exercise
- Expert Opinion
- Models - Incorporation
- Policy and Plans
- Execution Plan
- Development Plan
- Modifications Required
- For each Sector

### Output
- Execution Plan; Area based
- Location based
- Strategies
- Reserved areas
- Zoning
- Priority areas
- Conservation areas
- Suitable Technology application areas
- Allocation
- Development

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Revenue Department, Government of Gujarat
**INFRASTRUCTURE**

- **Settlements**
- **Demography**
- **Social Amenities**

**INFRASTRUCTURE**

**Satellite Data (High Resolution)**

**Road/ Rail Map (1:25,000 scale)**

**Category wise Road/ Rail Atlas**

**Data from Govt. Departments**

**Industrial Zones/ SEZs**

**Ports (Existing/ Proposed)**

**Proposed Industries/ Developmental Infrastructure**

**ATTRIBUTE INFORMATION**

**CATEGORIZATION**

**INTERPRETATION**

**CRITERIA MODELS**

- Proposals for Category Change
- Widening & Upgradation of Roads/ New Rural Connectivity
- Network Management
- Traffic Volume Studies
- Trip Distribution Models etc.
Watershed Development Concept

- Priority of Watersheds
- Natural Resource information and its analysis in GIS
- Action Plan of Watersheds
- Socio-Economic Indicators
- Agricultural and Forestry Practices / Options
- Field Survey data
- Post implementation Satellite Data
- Monitoring & Evaluation of watersheds
- Monitoring & Evaluation of watersheds

Revenue Department, Government of Gujarat
<table>
<thead>
<tr>
<th>Features</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LAND</strong></td>
<td></td>
</tr>
<tr>
<td>Land use</td>
<td>Satellite Data</td>
</tr>
<tr>
<td>Landform (hill, Alluvial, Coastal areas etc)</td>
<td>Satellite Data</td>
</tr>
<tr>
<td>Slope/Elevation</td>
<td>Satellite Data &amp; Open Source</td>
</tr>
<tr>
<td><strong>WATER</strong></td>
<td></td>
</tr>
<tr>
<td>Surface Water Bodies</td>
<td>Satellite Data</td>
</tr>
<tr>
<td>Ground Water condition</td>
<td>GWRDC, CGWB</td>
</tr>
<tr>
<td>Wells</td>
<td>Revenue Deptt.</td>
</tr>
<tr>
<td>Check Dam</td>
<td>Departmental Data</td>
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<tr>
<td><strong>Vegetation</strong></td>
<td></td>
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<tr>
<td>Agriculture</td>
<td>Agriculture Deptt, Satellite Data</td>
</tr>
<tr>
<td>Forest</td>
<td>Forest Deptt, Satellite Data</td>
</tr>
</tbody>
</table>
## Various GIS datasets

<table>
<thead>
<tr>
<th>Features</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-Economic Facilities, SC &amp; ST data, Actual Wages, Drinking Waters, % of SF &amp;MF, % Poverty Index</td>
<td>Deptt. of Rural Development., Bureau of Economic &amp; Statistics</td>
</tr>
<tr>
<td>Village Map</td>
<td>Computerized maps from Revenue Deptt.</td>
</tr>
<tr>
<td>Roads, Canals, Water Supply</td>
<td>Line Departments</td>
</tr>
<tr>
<td>Forests, Government, Panchayat, Private</td>
<td>Revenue Deptt.</td>
</tr>
<tr>
<td>Sanctuaries, Mining areas, CRZs, SEZs</td>
<td>Line Departments</td>
</tr>
</tbody>
</table>
Land Selection Methodology

Availability of Land

- Government
- Private land

Non Discretionary Parameters

- CPCB/GPCB Guidelines
- Double Crop
- Habitats
- Ind. estates
- Existing Structures

Subtract
Area to be Avoided

Investment Site Suitability

Superimposed Infrastructure

- Physical/Social Infrastructure
- Environment Infrastructure

Discretionary Parameters

- GPCB Zoning Atlas
- Regional balance / feedback

Strategic
Convergence of various technologies in MGNREGS

Web based GIS monitoring system at village level

Plan Maps in GIS

- GPS
- Mobile
- Remote Sensing
- Biometrics (under implementation)

Web based GIS Monitoring And Evaluation System

- Coordinate of Assets
- Data updation
- Satellite Imagery
- Security

Spatial Report

MGNREGA MIS
District: Narmada
Taluka: Sagbara
Village: Amiyar

Legend

- Wells
- Plantation
- Boriband

NREGA Works
- Proposed Work
- Completed Work
VILLAGE GIS (Initiated)
House Location and Details of Toilet Facility
**Gamtal & Amenities**

**Legend**

- Gamtal
- Aganvadi
- Gardan
- Community Hall
- Dudh Mandli
- Garm panchayt
- Bio-waste Dumping Site
- Havado
- POLLING BOOTH
- Sahkari Mandli
- School
- Smasan
- Temple
- Gater Dhakan
- Toilet
- TUBE WELL
- WATER TANK
- WELL
- Waterbody

**Village: Ramnagar, Taluka: Dhegam District: Gandhinagar**

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject</th>
<th>Number</th>
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<tbody>
<tr>
<td>1</td>
<td>Total No. of House Hold</td>
<td>126</td>
</tr>
<tr>
<td>2</td>
<td>Total No. of Toilet</td>
<td>126</td>
</tr>
<tr>
<td>3</td>
<td>Total No. of Population</td>
<td>771</td>
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<tr>
<td>4</td>
<td>Total No. of Student in Primary School</td>
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</tr>
<tr>
<td>5</td>
<td>Total No. of Student in Aganwadi Student</td>
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<tr>
<td>6</td>
<td>Total No. of Bio-Waste Dumping Site (Ukarda)</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>Vaccination</td>
<td>65%</td>
</tr>
</tbody>
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Applications

User specific maps

Customized GIS

Site Suitability

2D, 3D Geo-spatial database

Yes / No Decisions

Planning

Digital Atlases

Thematic Integration

Applicable to each Sector / Department
## Major GIS Applications

<table>
<thead>
<tr>
<th align="left">Municipal GIS</th>
<th align="center">Road GIS</th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">School GIS</td>
<td align="center">Panchayats GIS</td>
</tr>
<tr>
<td align="left">Environmental GIS</td>
<td align="center">Disaster Management (SDRN)</td>
</tr>
<tr>
<td align="left">MGNREGA GIS</td>
<td align="center">Cadastral/Land Bank GIS</td>
</tr>
<tr>
<td align="left">Coastal GIS</td>
<td align="center">Water Resources GIS</td>
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<tr>
<td align="left">Election GIS</td>
<td align="center">Water Supply GIS</td>
</tr>
<tr>
<td align="left">Decentralized Planning GIS</td>
<td align="center">Animal Husbandry GIS</td>
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<tr>
<td align="left">Health GIS</td>
<td align="center">Agriculture GIS</td>
</tr>
<tr>
<td align="left">Police GIS</td>
<td align="center">Electricity GIS</td>
</tr>
<tr>
<td align="left">Investor Support system</td>
<td align="center">Watershed GIS</td>
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</table>
Academy of Geo-Informatics for Sustainable Development: An Initiative for Capacity Building
Geo-informatics Applications: Implementation Mechanism

- Ownership/Control of projects with user departments
- Integration of Domain Knowledge with Geo-spatial datasets and Technology through collaboration/Partnership
- Compatibility of sectoral datasets on large scale (1:5000 for rural and 1:1000 for urban) and Standardisation
- Multipurpose and multi-hierarchical common Geo-spatial database through seamless integration
- Co-registered multi-year, multi-date, multi-sensor satellite data for solving complex problems
- Simple to use systems on in-house developed Software at low cost on both desktop and intranet
- Integrated solution (ERP) through of Different technologies like GIS, Remote sensing, Image Processing, Photogrammetry, GPS, Mobile, MIS, etc
- Large scale Grass root level applications
- Development of 3D Applications for 3D modeling and analysis
- Awareness creation and dissemination of information at grass root level through satellite communication.
Landuse Planning: Policy and Institutional Mechanism

- Resources
- Processes
- Technology Provider (BISAG)

Sustainable Development

- Common Man
- Functionaries
- Problem Definition
- Domain inputs
- Institutionalization

E-connectivity

- Policy
- Guidelines
- Monitoring
- Funding

Government

- Data
- Info

Land use plan

Plan

Recipient Agency

- Acceptability
- Adoptability
- Affordability

Bringing Relevance

Capacity Building And Delivery

Technology for mass usability
Gujarat Spatial Data Infrastructure

Develop standards, specifications
Mechanism for regular updation
Develop tools for effective database management
Future applications visualisation

Platform infrastructure and Capacity
Hardware Software

GUJARAT SPATIAL DATA INFRASTRUCTURE

Open source/In-house software to integrate GIS, MIS, GPS, mobile computing, DSS

Research to make the solutions operational

Geo-spatial Data

Convergence of Technologies and Domains

Easy human computer interaction

Develop simple, easy tools
Thank You