

Virtual Forum on SEEA-Ecosystem Accounting

Testing of Accounts – the Indian Experience

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Ministry of Statistics and Programme Implementation (MoSPI)

Government of India



Outline of presentation

- **Testing for Spatial Units:**
 - Details of national ecosystem classification used for the testing;
 - Results of the cross walking with IUCN GETs; and
 - Challenges.
- **Piloting the condition accounts:**
 - The prescribed 3 stage condition account approach;
 - Indicators used in the pilot condition accounts; and
 - Way forward.

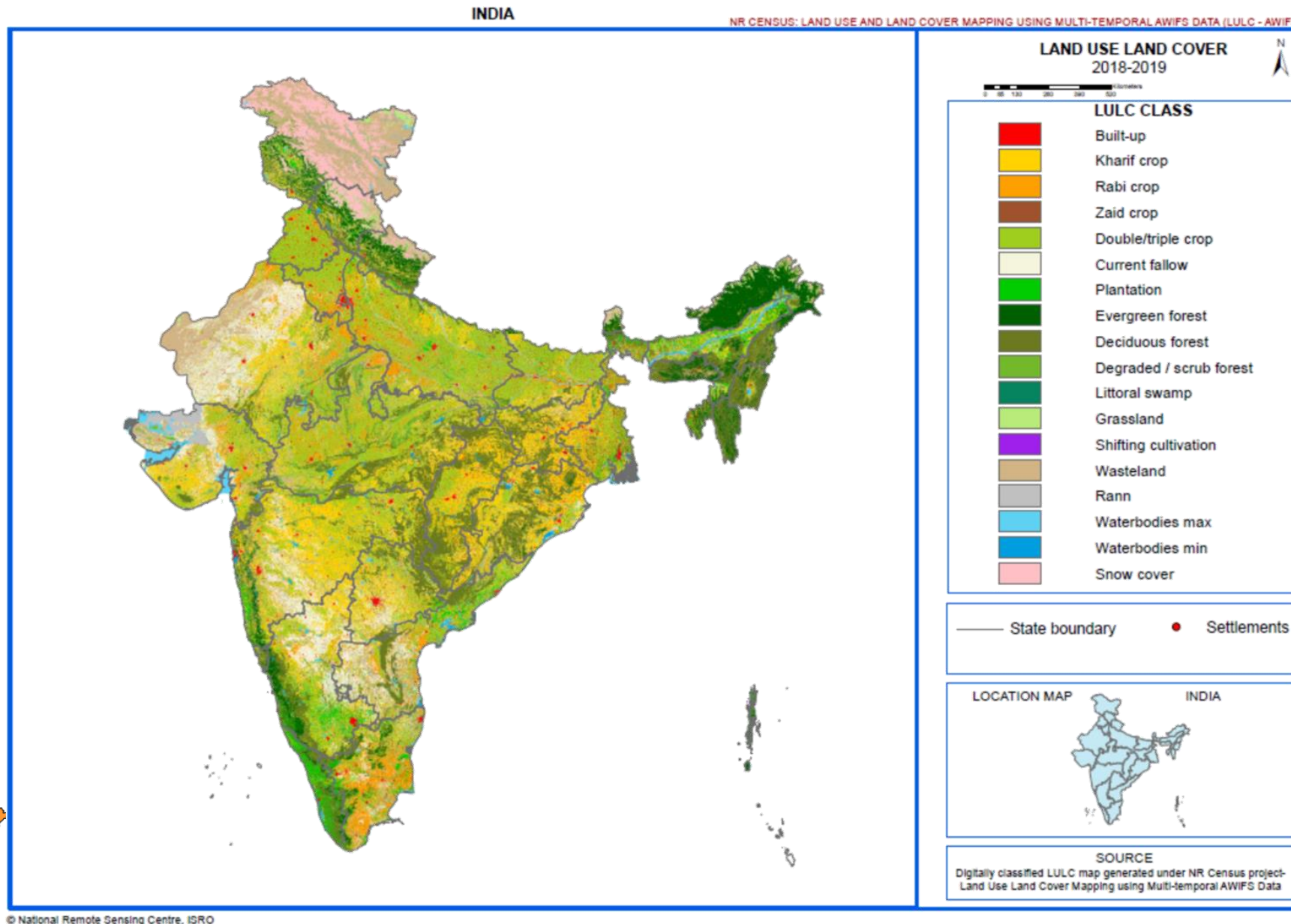


Testing of IUCN's Global Ecosystem Typology

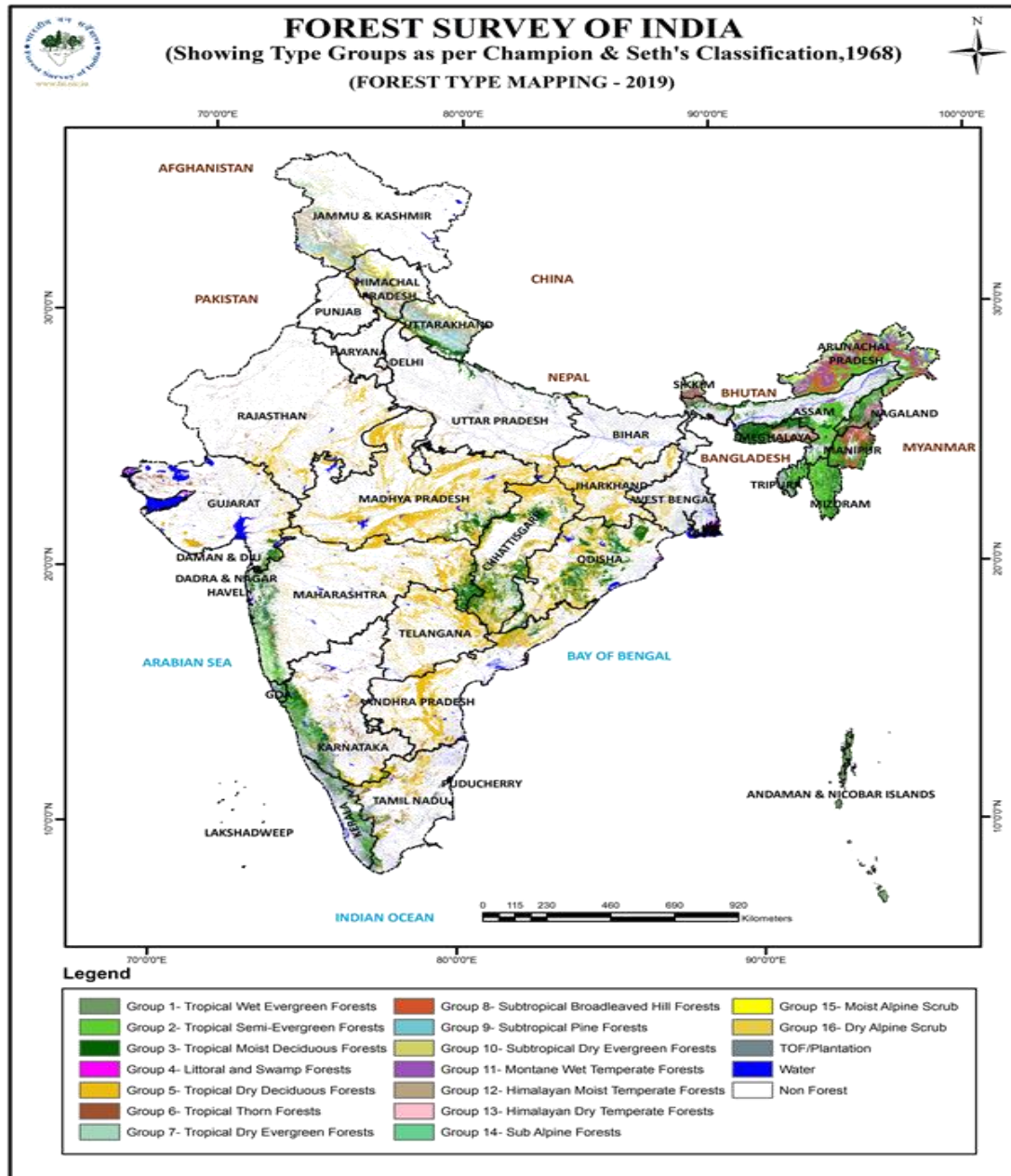


Land Use Land Cover in India

- *Source: National Remote Sensing Centre (NRSC), India*
- *54 Land Use/Land Cover Classes*



Forest type groups



Source: National Forest Inventory conducted biennially by Forest Survey of India (FSI)

– 16 Forest Type Groups

– Area ranging from 200 sq.km. to 300,000 sq.km.



Steps Used for Crosswalk

- LULC Classes / Forest type Groups as also “Coral Reefs” under the Marine ecosystem combined to prepare a “National Ecosystem Classification”
- This classification compared to Global Ecosystem Typology (<https://iucnrle.org/about-rle/ongoing-initiatives/global-ecosystem-typology/>)
 - Based on description of various EFGs and national classification
 - Based on maps and literature available on the different ecosystems in India
- 46 of the 104 IUCN EFGs could be mapped to national classes



Example of the Mapping to IUCN EFG

National Classification: Built-Up		IUCN EFGs		
Level II	Level III	T7.4 Urban and infrastructure lands	S2.1 Anthropogenic subterranean voids	F3.2 Constructed lacustrine wetlands
Urban	Built up – Compact/ Sparse (Continuous/ Discontinuous)	1		
	Built up – Vegetated / Open area	1		
	Industrial area	1		
	Ash / Cooling Pond / effluent and other waste			1
Rural	Rural	COULD NOT BE MAPPED		
Mining	Mining – Active		1	
	Mining – Abandoned		1	
	Quarry	COULD NOT BE MAPPED		



Challenges & possible resolutions

<p>Some of the national ecosystems could not be mapped under any of the classes</p> <ul style="list-style-type: none">- Built-up : Rural, Quarries; Barren/ Unculturable/ Wasteland, Seasonal salt marshes.	<p>Need for a few new classes in the IUCN EFGs since these ecosystems have distinct characteristics and hence a distinct set of ecosystem services.</p>
<p>Ambiguity in some of the cases which are not shown in India in the IUCN maps but they could be classified as being present in India</p>	<p>Existing description may need to be expanded to incorporate reasons for exclusions (OR) the maps given in the IUCN descriptions need to be updated</p>
<p>Aerobic Caves</p>	<p>National Maps may need to be fine-tuned</p>



Piloting Condition Accounts



Condition Accounts

- **The three-step approach**
 - **Step 1: Selection of ecosystem condition indicators (for each ecosystem type) and/or classify indicators as per the typology**
 - **Step 2: Set a reference condition and reference levels (for individual indicators)**
 - **Step 3: Aggregation**
- **Pilot accounts compiled for –**
 - **Croplands**
 - **Forests**
 - **Wetlands**



Condition Indicators for Croplands

- **Crop Diversity**
 - **Effective Number of Species**
- **Land Capability Classes**
- **Soil Nutrient Indices**
 - **Four Macro Nutrients and Six Micro Nutrients**
- **Irrigation Status**
 - **Percentage of Gross Irrigated Area to Total Cropped Area**
 - **Area Irrigated more than once**
 - **Cropping Intensity**
- **Also taken: Fragmentation of cropland as pressure indicator using Gini Index of Land Concentration**



Condition Indicators for Forests

- **Carbon Stock and Carbon Stock per unit area, by type of stock**
- **Extent of Wetlands Within Forest Area**
 - **Number and area of wetlands**
- **Biodiversity Assessment**
 - **Total Number of species; Shannon Weiner Index; Effective number of species by type of Forests**
- **Growing Stock**
- **Forest cover in different patch sizes; Average patch size**
- **Type of Protection:**
 - *Reserved Forests (RF); Protected Forest (PF); Unclassed Forests*



Condition Indicators for Wetlands

- **Characteristics measured in Pre-Monsoon and Post-Monsoon periods**
 - Open water in the wetlands
 - Aquatic Vegetation
 - Turbidity
- **Wetland Conservation Status**
 - Number and area of wetlands declared as Ramsar Sites; Share of Ramsar Sites in the total wetlands in the area
- **Ultimate Irrigation Potential of the wetlands in the area**



Example – Condition Account for Forests

Indicator	Unit	Value
Growing Stock		
<i>Volume of Growing Stock</i>	million cum	119.02
<i>% of country's Growing Stock</i>		2.79
<i>Growing Stock in Forest</i>	cum/ha	31.94
Carbon Stock		
<i>Total</i>	'000 tonnes	2,19,528
<i>AGB</i>	'000 tonnes	60,972
<i>BGB</i>	'000 tonnes	24,206
<i>Dead Wood</i>	'000 tonnes	629
<i>Litter</i>	'000 tonnes	3,074
<i>SOC</i>	'000 tonnes	1,30,647
Carbon Stock per hectare		
<i>Total</i>	per hectare stock in tonnes	75.34
<i>AGB</i>	per hectare stock in tonnes	20.93
<i>BGB</i>	per hectare stock in tonnes	8.31
<i>Dead Wood</i>	per hectare stock in tonnes	0.22
<i>Litter</i>	per hectare stock in tonnes	1.05
<i>SOC</i>	per hectare stock in tonnes	44.84



Example – Condition Accounts for Forests

Type of Protection		
<i>Recorded Forest Area (RFA)</i>	sq km	37,258
	% of GA	22.86
<i>Reserved Forests (RF)</i>	sq km	31,959
<i>Protected Forest (PF)</i>	sq km	5,069
<i>Unclassed Forests</i>	sq km	230
Wetlands Within RFA		
	Number	1,174
	Area (in sq km)	723.58
	% of RFA	1.91



Example – Condition Accounts for Forests

Biodiversity Assessment	<i>Herbs</i>	<i>Shrubs</i>	<i>Trees</i>
Total Number of species	58	64	242
Shannon Weiner Index	<i>Herbs</i>	<i>Shrubs</i>	<i>Trees</i>
Tropical Moist Deciduous Forests	2.89	2.13	3.15
Tropical Dry Deciduous Forests	2.63	2.92	4.07
Tropical Thorn Forests	2.25	2.37	3.74
Tropical Dry Evergreen Forests	2.07	2.55	3.28
Littoral and Swamp Forests	*	1.43	*
Effective Number of Species	<i>Herbs</i>	<i>Shrubs</i>	<i>Trees</i>
Tropical Moist Deciduous Forests	17.99	8.41	23.34
Tropical Dry Deciduous Forests	13.87	18.54	58.56
Tropical Thorn Forests	9.49	10.70	42.10
Tropical Dry Evergreen Forests	7.92	12.81	26.58
Littoral and Swamp Forests		4.18	

Forest Fragmentation

Average Patch Size	Sq km	1.55	
Proportion of small patches (≥ 0.01sq km to ≤ 1 sq km) in percentage		95.60	
Patch Size Range (in sq. km)	No. of Patches	Area (Sq km)	Percentage
>=0.01 <=1.0	17,409	1,425	5.06
>1.0 <=10	644	1,894	6.73
>10 <=100	132	4,063	14.44
>100 <=500	25	20,765	73.77
Total	18,210	28,147	100



Way Forward

- **For spatial units**
 - **Further deliberations on shares of national ecosystem attributed to the IUCN GETs**
- **For condition accounts**
 - **Deliberate on some more indicators that need to be incorporated as per the typology**
 - **Deliberate on reference levels and reference conditions with the stakeholders**
 - **Deliberate on methods that could be used for aggregation**



Questions for the group

- **Related to use of a uniform classification for spatial units:**
 - **What could be the main bottlenecks in adopting a uniform classification?**
 - **How could these be solved?**
 - **Can a prescription be made for the number of ET classes in respect of ecosystem accounting?**
 - **What (additional) guidance material would be required?**



Questions for the group

- **Related to the proposal for condition accounts:**
 - **Is there any specific content that you would like to be added to the current guidance on the compilation of the condition accounts?**
 - **Can a prescription be made for the minimum list of indicators or a typology for indicators?**
 - **What kind of guidance will help countries choose appropriate reference conditions or reference levels?**
 - **What are your views on the aggregation methods?**



Points for the Plenary

- Perhaps introduce an “Other class” (with indication of biomes) as
- Need to think how to integrate with the economy / management
- Temporal variation is an issue (within a year, but also in several years)
- “Natural” – hard to know what you mean with that (agricultural may be required if not becomes forest) / “we are also one of the species”
- Can't we first define ES (per ET) , then find condition indicators + references?



Let's continue to keep a tab on the ecosystems

