

Synthesis Assessment

Rod Keenan



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Why are we doing this?

Support implementation of sustainable forest management through the provision of sound information to inform policy and management decisions



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Science and policy: some fundamental differences

Scientists

- **Seeking truth**
- **Long-term view**
- **Open to many viewpoints**
- **Focus on state of environment or the ecosystem**
- **Ration and logic**

Policy makers

- **Seeking a solution**
- **Short-term view**
- **Once policy is decided, alternative viewpoints not encouraged or considered helpful**
- **Focus on public attitudes, perceptions and emotions**



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Telling a story

Simple

- **Distill a complex issue to focus on the key element**

Personal

- **Explain the impact on a particular person (e.g., a forest landowner or visitor)**

Dramatic

- **Appeal to audience interests**

Symbolic

- **Associate results with an individual with a larger portion of society who will benefit or be impacted**



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Telling the FRA story

- **Headline variables**
- **Composite indices**



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Headline indicators

- forest area
- other wooded land area
- Area of primary forest
- area with designated primary function of biodiversity conservation
- productive plantation area
- total growing stock commercial timber
- total carbon stock
- total volume and value of wood removals
- total number of people employed in forests



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Composite indices

- **Economic indicators**
 - GDP
 - unemployment



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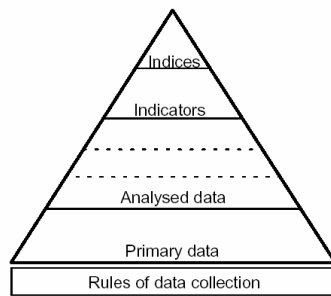


Figure 1: The Information Pyramid (adapted from WRI, 1995, p.1).



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Composite indices: desirable properties

- **Clear message, easily understood and interpreted**
- **Strong scientific or theoretical basis**
- **Policy relevance**
- **Efficiently represent different elements being integrated**
- **Temporal relevance (capable of being backdated, suitable for long-term measurement)**



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Composite indices

- **environmental sustainability index (ESI)**
- **ecological footprint**
- **consumption pressure index**
- **living planet index**
- **green GDP**



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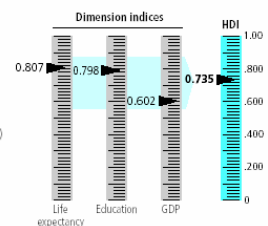
Human Development Index

4. Calculating the HDI

Once the dimension indices have been calculated, determining the HDI is straightforward. It is a simple average of the three dimension indices.

$$\text{HDI} = \frac{1}{3} (\text{life expectancy index}) + \frac{1}{3} (\text{education index}) + \frac{1}{3} (\text{GDP index})$$

$$= \frac{1}{3} (0.807) + \frac{1}{3} (0.798) + \frac{1}{3} (0.602) = 0.735$$



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Pressure, state and response (PSR model)

Pressures

- forest loss
- annual timber production

States

- carbon or timber stock
- forest area
- number of threatened species

Response

- forest plantation area
- protected forest area



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Purpose?

- Compare between countries
- Trends across time
- Regional analysis



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Technical issues

- Variable selection
- Scaling, ranking and standardising
- Missing data
- Aggregation
- Weighting



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Variable selection in FRA

- 15 tables
- 40 'primary' variables
- 11 component variables
- 3 time periods



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Variable selection

List of variables selected for synthesis assessment by thematic area

Thematic element	FRA 2005 variables or derivatives	Unit
Extent of forest resources	Area of forest	ha
	Area of other wooded land	ha
	Growing stock of forests	m ³
	Carbon stock per hectare in forest biomass	tonnes/ha
Biological diversity	Area of primary forest	ha
	Area of forest designated primarily for conservation of biological diversity	ha
	Total forest area excluding area of productive forest plantations	ha
Forest health and vitality	Area of forest affected by fire	ha/year
	Area of forest affected by insects, diseases and other disturbances	ha/year
Productive functions of forest resources	Area of forest designated primarily for production	ha
	Area of productive forest plantations	ha
	Commercial growing stock	m ³
	Total wood removals	m ³ /year
	Total NWFP removals	tonnes/year
Protective functions of forest resources	Area of forest designated primarily for protection	ha
	Area of protective forest plantations	ha
Socio-economic functions	Value of total wood removals	US\$/year
	Value of total NWFP removals	US\$/year
	Total employment	person years
	Area of forest under private ownership	ha
	Area of forest designated primarily for social services	ha



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Regional data availability

- High: 75–100 % of total forest area
- Medium: 50–74 %
- Low: 25–49 %
- Less than 25 %: no data



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Assessment

- = Positive change (greater than 0.50%)
- = No major change (between -0.50 and 0.50%)
- = Negative change (less than -0.50%)
- = Insufficient data to determine trend



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Global analysis, negatives

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.21	-8 951	1 000 ha
	Area of other wooded land	M	-0.35	-3 299	1 000 ha
	Growing stock of forests	H	-0.15	-570	million m ³
	Carbon stock per hectare in forest	H	-0.02	-0.15	tonnes/ha
Biological diversity	Area of primary forest	H	-0.52	-5 848	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	1.87	6 291	1 000 ha
	Total forest area excluding area of productive forest plantations	H	-0.26	-9 397	1 000 ha
Forest health and vitality	Area of forest affected by fire	M	-0.49	-125	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	M	1.84	1 101	1 000 ha
	Area of forest designated primarily for production	H	-0.35	-4 552	1 000 ha
Productive functions of forest resources	Area of productive forest plantations	H	2.38	2 165	1 000 ha
	Commercial growing stock	H	-0.18	-621	million m ³
	Total wood removals	H	-0.11	-3 199	1 000 m ³
	Total NWFP removals	M	2.47	143 460	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	1.06	3 375	1 000 ha
	Area of protective forest plantations	H	1.41	360	1 000 ha
Socio-economic functions	Value of total wood removals	L	0.67	377	million US\$
	Value of total NWFP removals	M	0.80	33	million US\$
	Total employment	M	-0.97	-102	1 000 pers. yrs
	Area of forest under private ownership	M	0.76	2 737	1 000 ha
	Area of forest designated primarily for social services	H	8.63	6 646	1 000 ha



Global analysis, positives

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.21	-8 951	1 000 ha
	Area of other wooded land	M	-0.35	-3 299	1 000 ha
	Growing stock of forests	H	-0.15	-570	million m ³
	Carbon stock per hectare in forest	H	-0.02	-0.15	tonnes/ha
Biological diversity	Area of primary forest	H	-0.52	-5 848	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	1.87	6 291	1 000 ha
	Total forest area excluding area of productive forest plantations	H	-0.26	-9 397	1 000 ha
Forest health and vitality	Area of forest affected by fire	M	-0.49	-125	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	M	1.84	1 101	1 000 ha
	Area of forest designated primarily for production	H	-0.35	-4 552	1 000 ha
Productive functions of forest resources	Area of productive forest plantations	H	2.38	2 165	1 000 ha
	Commercial growing stock	H	-0.18	-621	million m ³
	Total wood removals	H	-0.11	-3 199	1 000 m ³
	Total NWFP removals	M	2.47	143 460	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	1.06	3 375	1 000 ha
	Area of protective forest plantations	H	1.41	360	1 000 ha
Socio-economic functions	Value of total wood removals	L	0.67	377	million US\$
	Value of total NWFP removals	M	0.80	33	million US\$
	Total employment	M	-0.97	-102	1 000 pers. yrs
	Area of forest under private ownership	M	0.76	2 737	1 000 ha
	Area of forest designated primarily for social services	H	8.63	6 646	1 000 ha



Africa

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.64	-3 263	1 000 ha
	Area of other wooded land	M	-0.52	-2 193	1 000 ha
	Growing stock of forests	H	-0.41	-275	million m ³
	Carbon stock per hectare in forest	H	0.01	0.1	tonnes/ha
Biological diversity	Area of primary forest	M	-0.68	-270	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	M	0.27	182	1 000 ha
	Total forest area excluding area of productive forest plantations	M	-0.75	-3 361	1 000 ha
Forest health and vitality	Area of forest affected by fire	-	-	-	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	-	-	-	1 000 ha
	Area of forest designated primarily for production	M	-0.64	-911	1 000 ha
Productive functions of forest resources	Area of productive forest plantations	M	0.41	42	1 000 ha
	Commercial growing stock	M	-0.39	-22	million m ³
	Total wood removals	H	1.89	10 767	1 000 m ³
	Total NWFP removals	M	0.76	2 737	1 000 ha
Protective functions of forest resources	Area of forest designated primarily for protection	M	-0.25	-52	1 000 ha
	Area of protective forest plantations	M	1.22	26	1 000 ha
Socio-economic functions	Value of total wood removals	M	-0.04	-0.2	million US\$
	Value of total NWFP removals	M	-	-	million US\$
	Total employment	L	3.44	12	1 000 pers. yrs
	Area of forest under private ownership	M	-0.48	-49	1 000 ha
	Area of forest designated primarily for social services	M	-0.04	-0.2	1 000 ha



Asia

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.03	-194	1 000 ha
	Area of other wooded land	M	-0.36	-697	1 000 ha
	Growing stock of forests	H	-0.58	-286	million m ³
	Carbon stock per hectare in forest	H	-0.15	-1	tonnes/ha
Biological diversity	Area of primary forest	H	-1.52	-1 510	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	1.31	868	1 000 ha
	Total forest area excluding area of productive forest plantations	H	-0.23	-1 224	1 000 ha
Forest health and vitality	Area of forest affected by fire	H	1.15	127	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	M	0.30	35	1 000 ha
	Area of forest designated primarily for production	H	-0.30	-374	1 000 ha
Productive functions of forest resources	Area of productive forest plantations	H	2.00	1 033	1 000 ha
	Commercial growing stock	M	0.51	95	million m ³
	Total wood removals	H	-1.49	-4 116	1 000 m ³
	Total NWFP removals	M	1.71	169 795	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	1.34	325	1 000 ha
	Area of protective forest plantations	H	0.99	187	1 000 ha
Socio-economic functions	Value of total wood removals	H	-2.27	-452	million US\$
	Value of total NWFP removals	L	1.40	191	million US\$
	Total employment	H	-1.15	-100	1 000 pers. yrs
	Area of forest under private ownership	H	0.66	179	1 000 ha
	Area of forest designated primarily for social services	H	1.18	99	1 000 ha



Europe

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	0.08	805	1 000 ha
	Area of other wooded land	H	-0.28	-286	1 000 ha
	Growing stock of forests	H	0.33	340	million m ³
	Carbon stock per hectare in forest	H	0.02	0.1	tonnes/ha
Biological diversity	Area of primary forest	H	0.37	356	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	4.72	1 224	1 000 ha
	Total forest area excluding area of productive forest plantations	H	0.03	332	1 000 ha
Forest health and vitality	Area of forest affected by fire	H	4.27	54	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	H	6.27	729	1 000 ha
	Area of forest designated primarily for production	H	-0.44	-3 277	1 000 ha
Productive functions of forest resources	Area of productive forest plantations	H	1.71	322	1 000 ha
	Commercial growing stock	H	-0.52	-322	million m ³
	Total wood removals	H	-0.67	-4 783	1 000 m ³
	Total NWFP removals	M	-0.69	-1 872	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	0.99	826	1 000 ha
	Area of protective forest plantations	H	1.86	97	1 000 ha
Socio-economic functions	Value of total wood removals	H	1.46	22	million US\$
	Value of total NWFP removals	H	-2.61	-62	million US\$
	Total employment	H	-2.61	-62	1 000 pers. yrs
	Area of forest under private ownership	H	1.36	1 257	1 000 ha
	Area of forest designated primarily for social services	H	-1.89	-495	1 000 ha



North and Central America

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.05	-329	1 000 ha
	Area of other wooded land	L	0.01	16	1 000 ha
	Growing stock of forests	M	0.23	159	million m ³
	Carbon stock per hectare in forest biomass	L	0.05	0.3	tonnes/ha
Biological diversity	Area of primary forest	H	-0.17	-545	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	0.06	712	1 000 ha
	Total forest area excluding area of productive forest plantations	H	-0.12	-800	1 000 ha
Forest health and vitality	Area of forest affected by fire	H	-0.14	-6	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	H	0.08	307	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	H	-0.05	-21	1 000 ha
	Area of productive forest plantations	H	3.46	471	1 000 ha
	Commercial growing stock	M	0.27	160	million m ³
	Total wood removals	H	-0.14	-1 201	1 000 m ³
	Total NWFP removals	H			tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	2.05	77	1 000 ha
	Area of productive forest plantations	H	13.14	427	1 000 ha
Socio-economic functions	Value of total wood removals	M	4.19	617	million US\$
	Value of total NWFP removals	M	2.66	1.6	million US\$
	Total employment	H	0.98	4.8	1 000 pers. yrs
	Area of forest under private ownership	H	0.06	128	1 000 ha
	Area of forest designated primarily for social services	H	0	0	1 000 ha

H = High reporting countries represent 75-100% of total forest area
 M = Medium reporting countries represent 50-75% of total forest area
 L = Low reporting countries represent 25-50% of total forest area
 + Positive change (greater than 0.50%)
 - Negative change (less than -0.50%)
 = Insufficient data to determine trend



Oceania

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.20	-417	1 000 ha
	Area of other wooded land	L			1 000 ha
	Growing stock of forests	M			million m ³
Biological diversity	Area of primary forest	H	0.24	82	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	-0.23	-471	1 000 ha
Forest health and vitality	Area of forest affected by fire	H			1 000 ha
	Area of forest affected by insects, diseases and other disturbances	H			1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	H			1 000 ha
	Area of productive forest plantations	H	3.00	51	1 000 ha
	Total wood removals	H	2.56	1 348	1 000 m ³
Protective functions of forest resources	Area of forest designated primarily for protection	H			1 000 ha
	Area of productive forest plantations	H	28.34	14	1 000 ha
Socio-economic functions	Value of total wood removals	M			million US\$
	Value of total NWFP removals	M			million US\$
	Total employment	H	0.78	0.3	1 000 pers. yrs

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South America

Thematic element	Trends in FAO 2005 variables or derivatives	Data availability	1990-2005 Annual change rate (%)	1990-2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.66	-1 962	1 000 ha
	Area of other wooded land	L	-0.13	-138	1 000 ha
	Growing stock of forests	M	-0.51	-503	million m ³
	Carbon stock per hectare in forest biomass	H	0	0	tonnes/ha
Biological diversity	Area of primary forest	H	-0.53	-1 207	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	3.69	3 342	1 000 ha
	Total forest area excluding area of productive forest plantations	H	-0.49	-1 872	1 000 ha
Forest health and vitality	Area of forest affected by fire	H	1.00	1	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	H	4.13	46	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	H	0.21	190	1 000 ha
	Area of productive forest plantations	H	2.16	207	1 000 ha
	Commercial growing stock	M	-0.97	-229	million m ³
	Total wood removals	M	-0.76	-1 214	1 000 m ³
	Total NWFP removals	M	-2.14	-10 800	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	7.88	1	1 000 ha
	Area of productive forest plantations	H	-1.23	-760	1 000 ha
Socio-economic functions	Value of total wood removals	M	-5.10	-15	million US\$
	Value of total NWFP removals	M			million US\$
	Total employment	H			1 000 pers. yrs
	Area of forest under private ownership	H	20.33	7 102	1 000 ha
	Area of forest designated primarily for social services	H			1 000 ha

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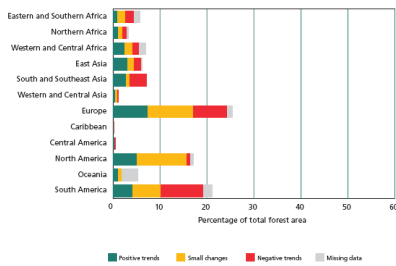
Sub-regional analysis

Themes and variables	Africa			Asia		
	Eastern and Southern	Northern	Western and Central	East	South and Southeast	Western and Central
Extent of forest resources						
Area of forest	H	H	H	H	H	H
Area of other wooded land	M	L	H	H	M	H
Growing stock of forests	H	H	H	H	H	H
Carbon stock per hectare in forest biomass	H	H	H	H	H	H
Biological diversity						
Area of primary forest	H	H	L	H	H	H
Area of forest designated primarily for conservation of biological diversity	H	H	L	H	H	H
Total forest area excluding area of productive forest plantations	H	H	L	H	H	H



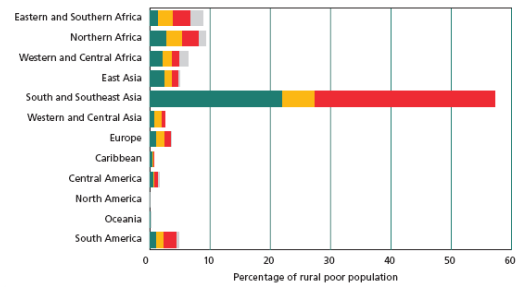
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Forest area weighted analysis



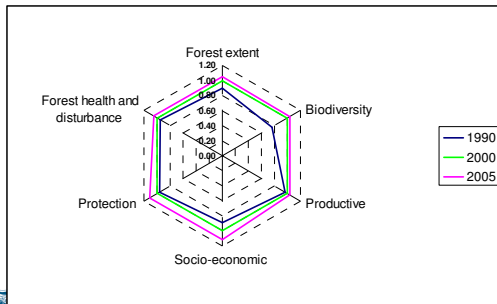
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Rural poor weighted



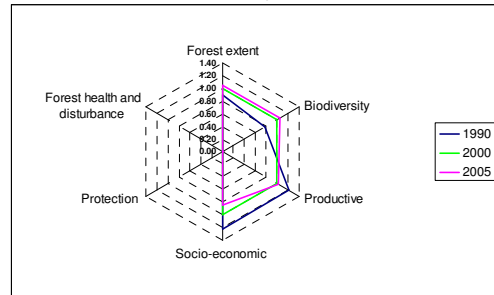
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Hypothetical case



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Country A...



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Issues

- FRA variables do not address all aspects of sustainable forest management
- Low quality, out of date or missing data
- Subjective variable selection that may not be relevant for all countries or at different scales
- Value judgement on 'positive' or 'negative' trends
 - Forest area, wood removals, employment, area conserved for biodiversity
- Trends by region obscures positive or negative trends in individual countries



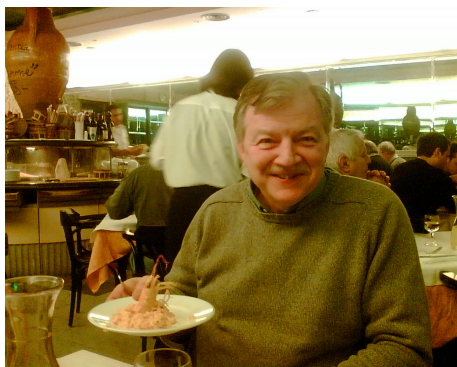
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Next steps

- Develop your own stories
- Promote the key messages from FRA
 - Policy makers
 - Forest managers
 - Public
- Incorporate results in policy and target setting
- Sell the benefits of the FRA process



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