Rapid Biomass Assessment for Dry Forest Monitoring

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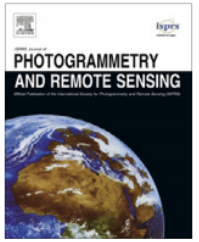

Improving the prediction of African savanna vegetation variables using time series of MODIS products

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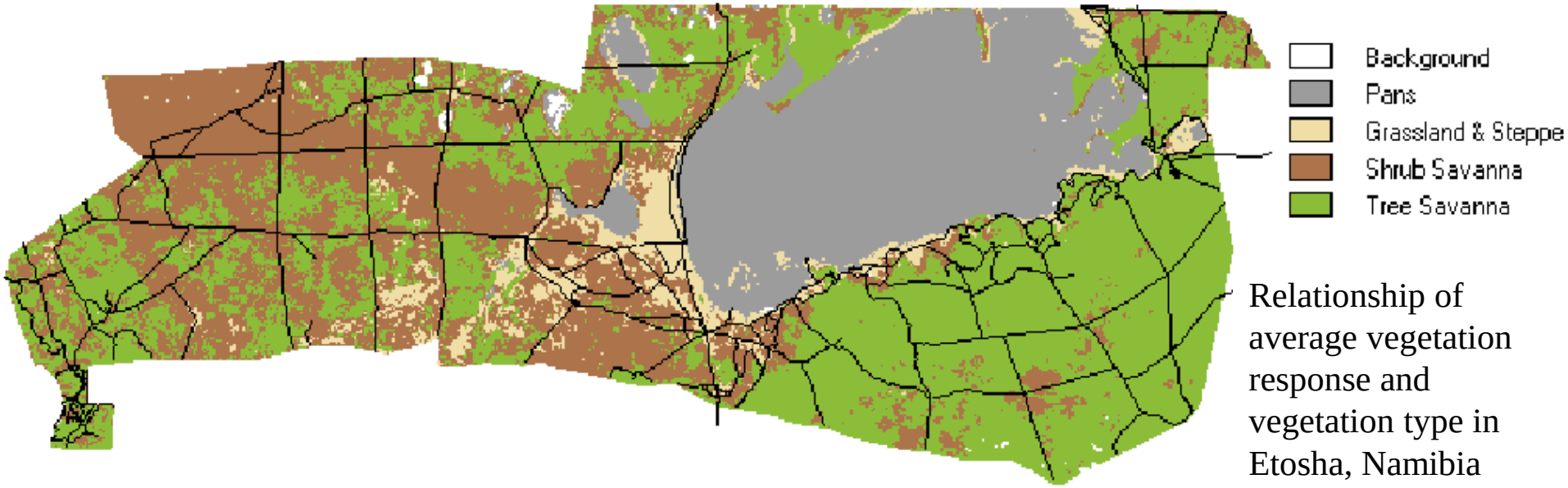
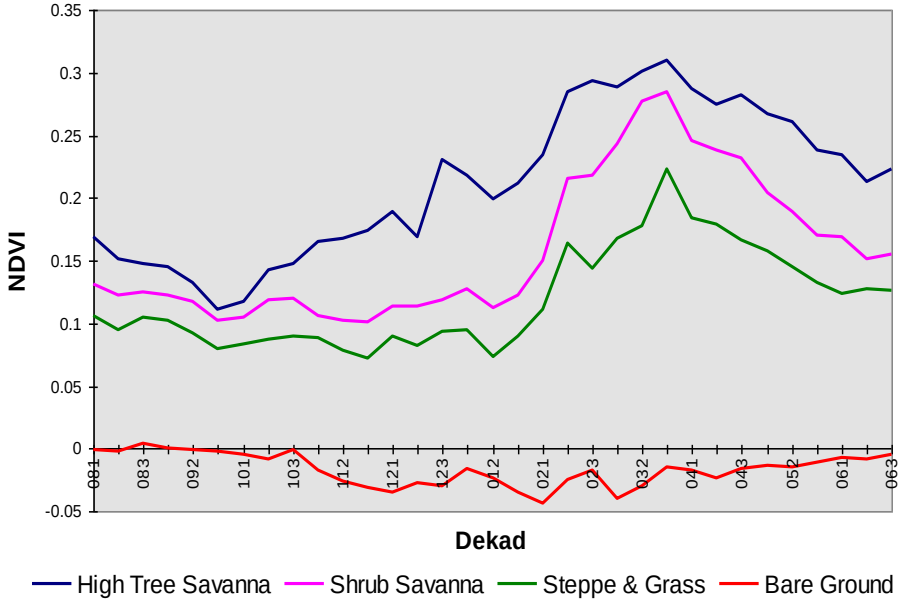
NDVI response of Etosha main vegetation types

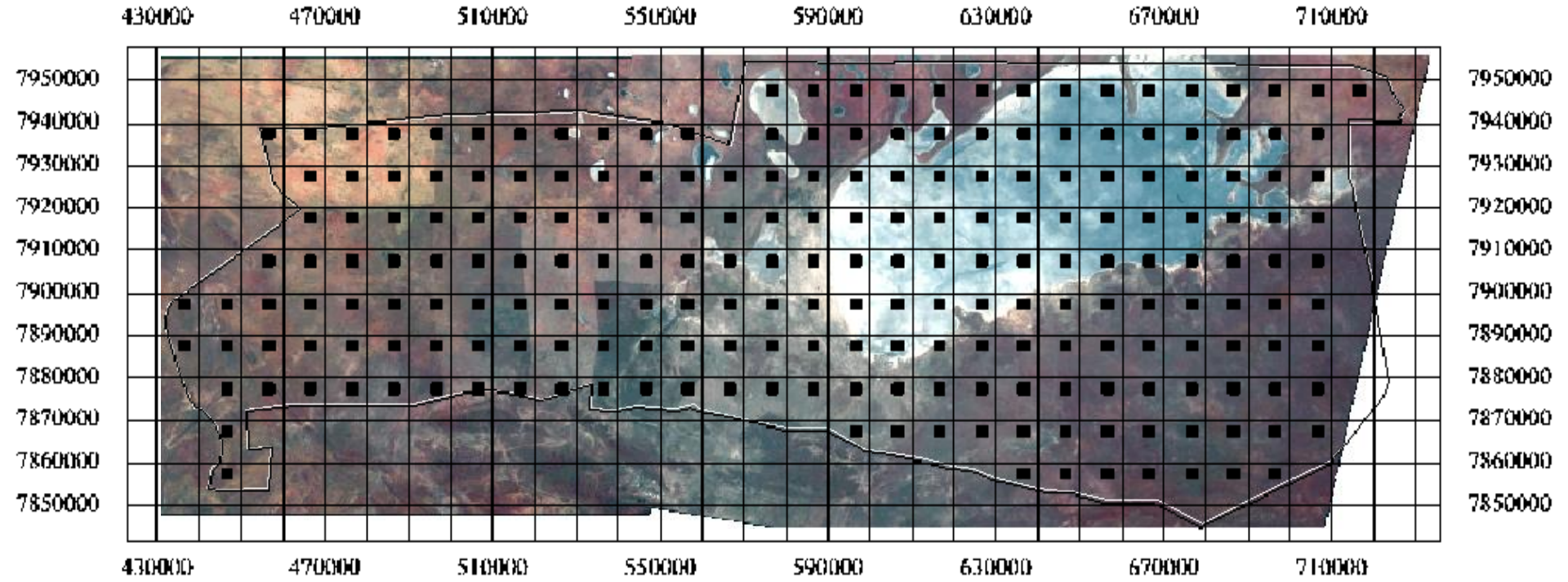


Relationship of average vegetation response and vegetation type in Etosha, Namibia



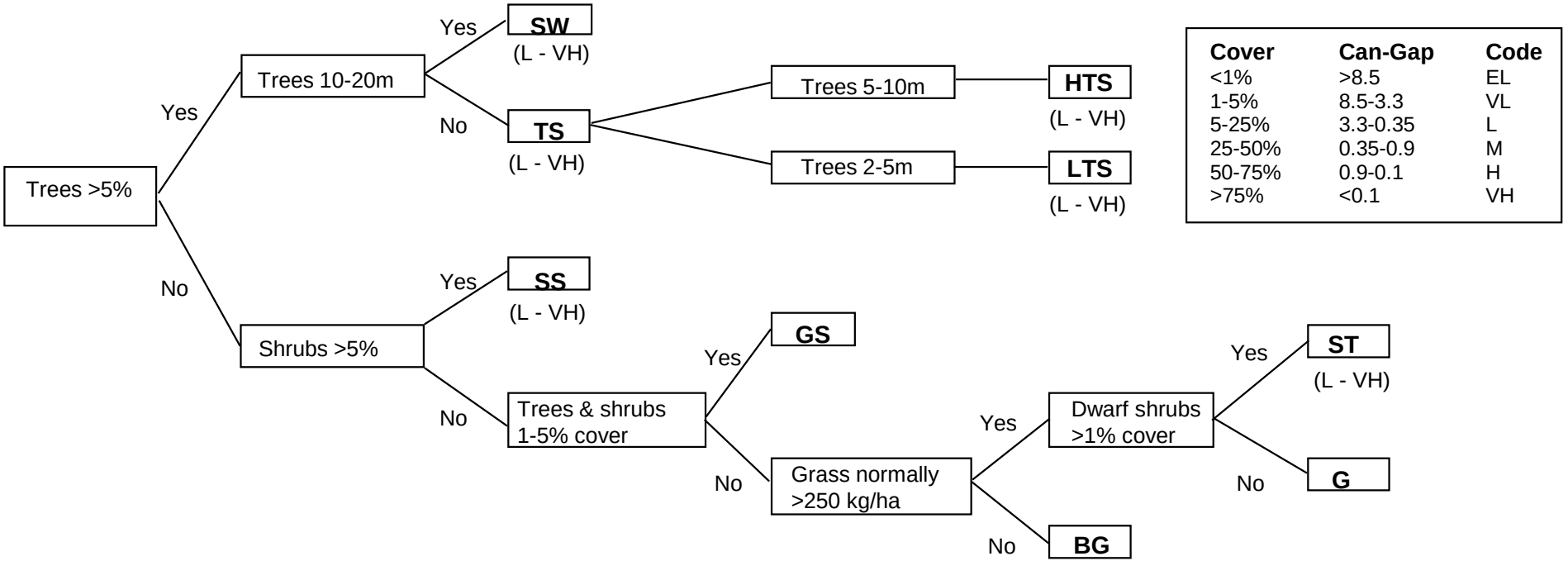
Vegetation mapping sampling strategy

- Randomly aligned systematic sample
- 1 Km^2 site
- 1% sampling rate



Vegetation classification scheme

- Physiognomic classification scheme based on height and density of ligneous component
- hierarchical classification making logical grouping of classes possible



Cover	Can-Gap	Code
<1%	>8.5	EL
1-5%	8.5-3.3	VL
5-25%	3.3-0.35	L
25-50%	0.35-0.9	M
50-75%	0.9-0.1	H
>75%	<0.1	VH

Main vegetation types in Etosha

High Tree Savanna

Low Tree Savanna

Shrub Savanna

Grass Savanna

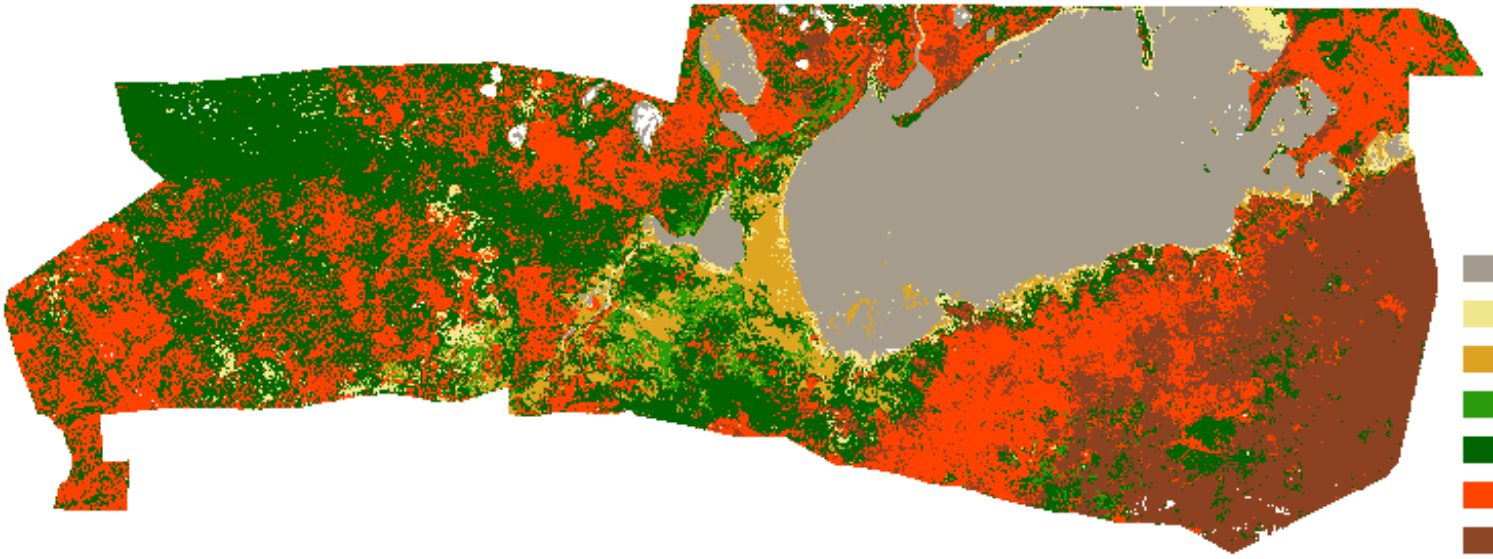
Grassland

Steppe

Field survey

- Ground and aerial survey
- Field document
  - geo-referenced TM imagery
    - 1:125,000 for navigation
    - 1:30,000 for accessing site
    - 1:10,000 for mapping
- Photo-interpretation of vegetation boundaries
- Identification of vegetation type in the field using handheld GPS for navigating

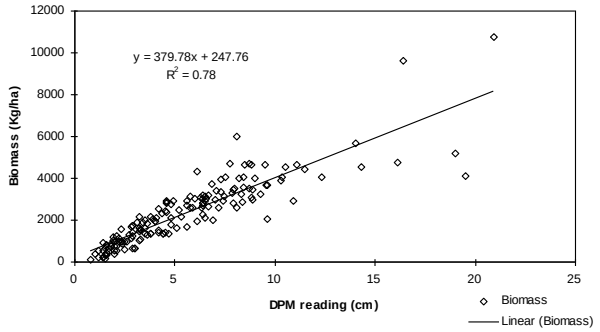
Digital classification



			REFERENCE								
			1	2	3	4	5	6	7	Total	User
C	1	Bare Ground	2454	21	1		1	11		2488	99%
L	2	Grassland	54	140	16	5	62	15	12	304	46%
A	3	Steppe	46	75	407	48	46	35		657	62%
S	4	Grass Savanna		2	13	50	74	46	4	189	26%
S	5	Shrub Savanna	17	23	34	21	1824	793	82	2794	65%
I	6	Low Tree Savanna	1	16	6	2	932	1539	151	2647	58%
F	7	High Tree Savanna		6			284	363	687	1340	51%
		Total	2572	283	477	126	3223	2802	936	10419	
		Prod	95%	49%	85%	40%	57%	55%	73%		68%

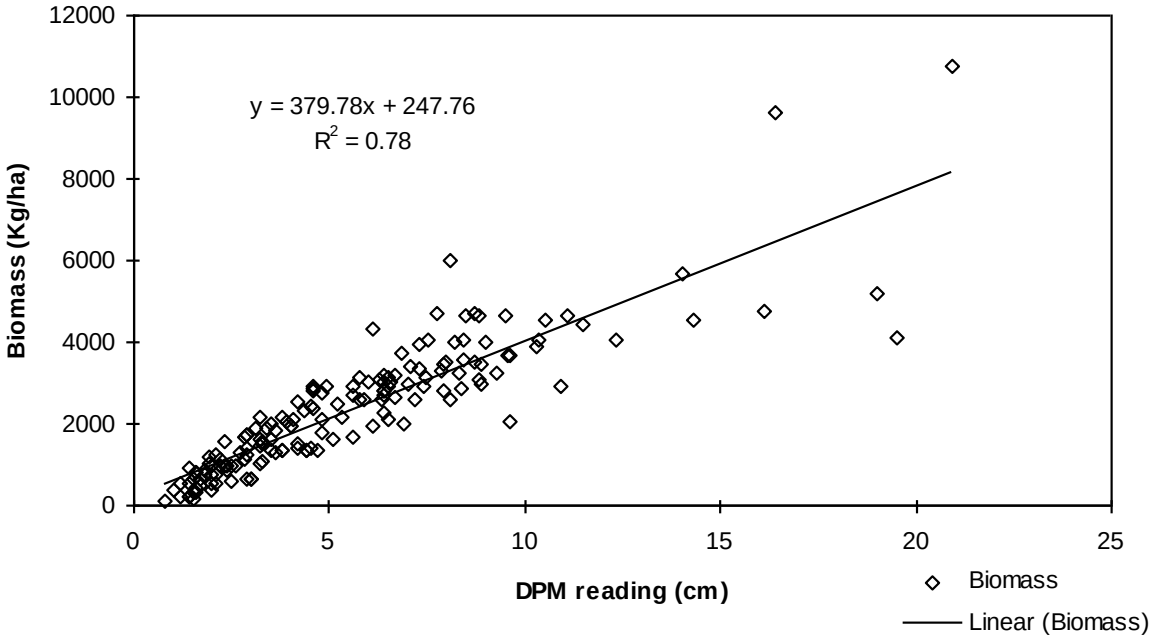
Biomass Calibration

Field Observations



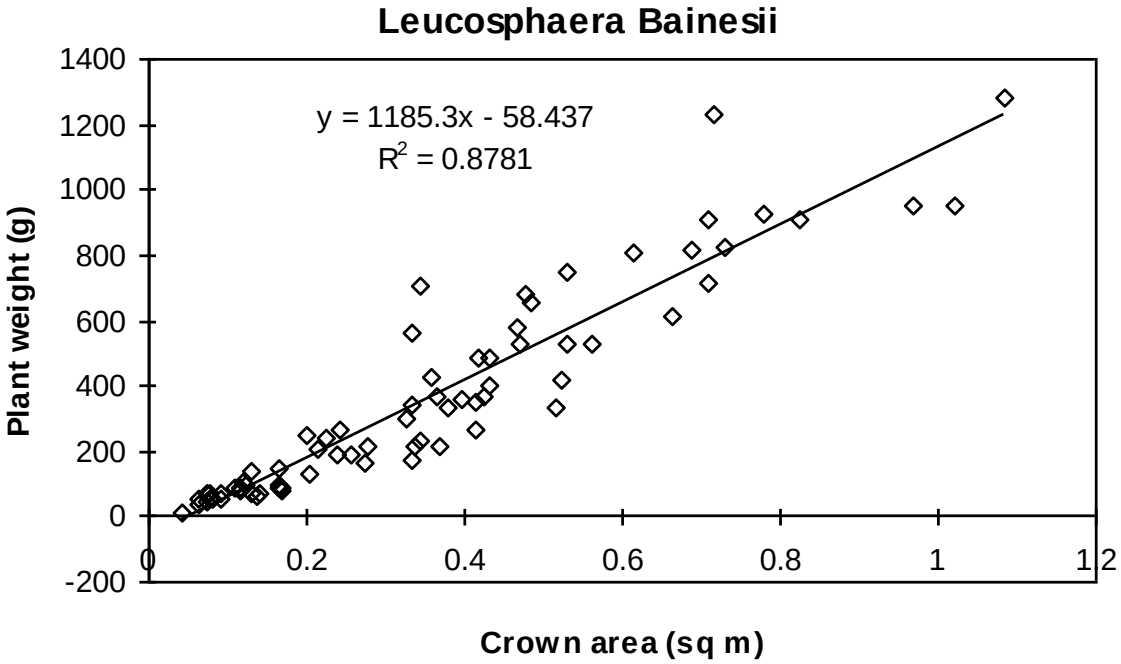
Rapid methods of field biomass assessment were developed to quickly determine above ground green biomass over sites large enough to allow calibration of satellite imagery.

Estimation of grass biomass: the Disc Pasture Meter

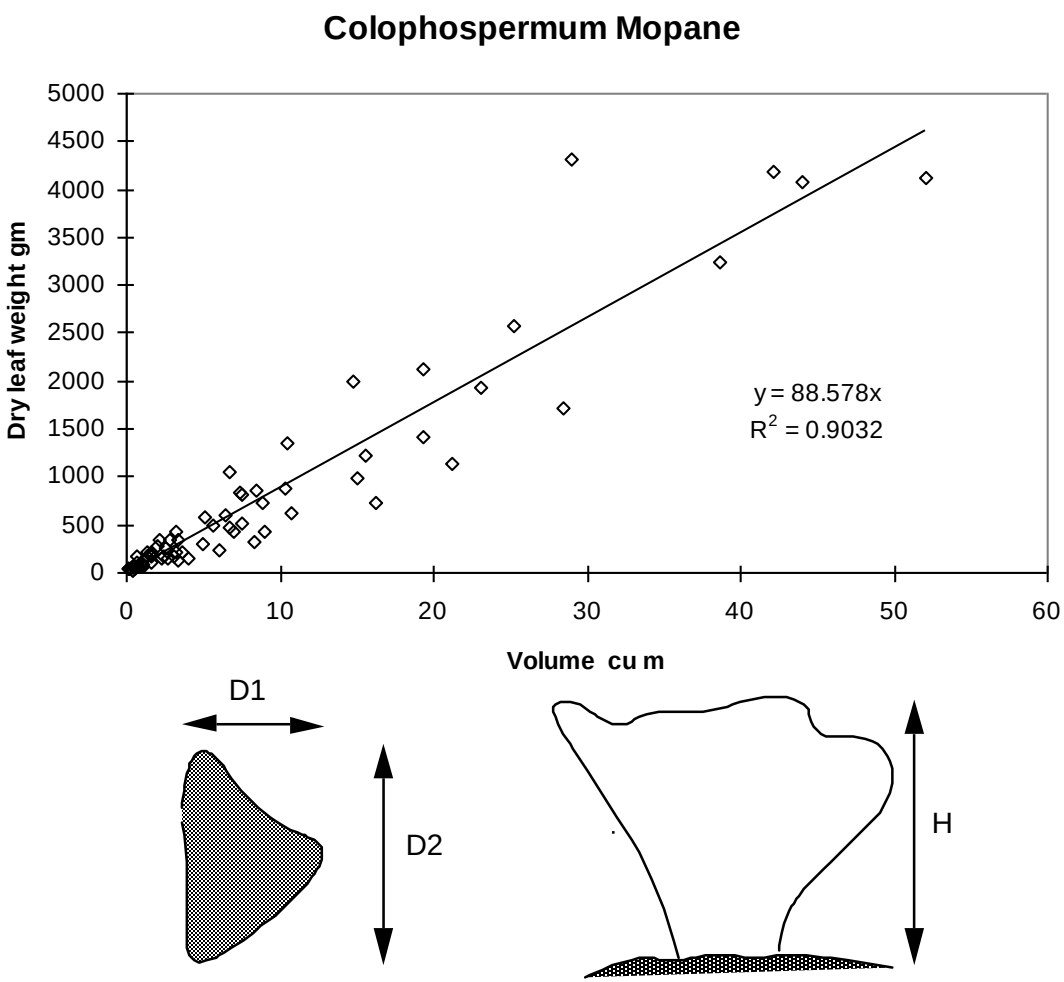


(courtesy of Wynand du Plessis, EEI 1995)

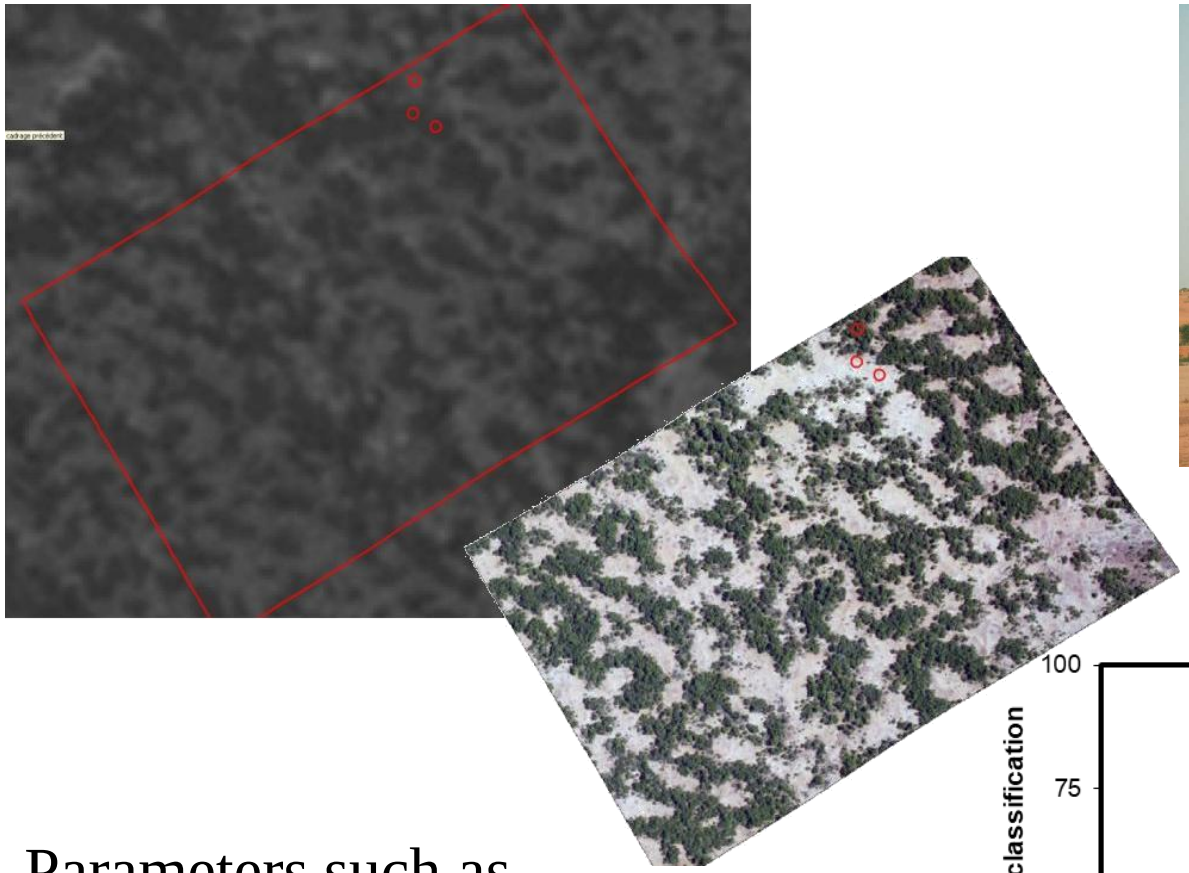
Calibration of Leucosphaera Bainesii with plant crown area



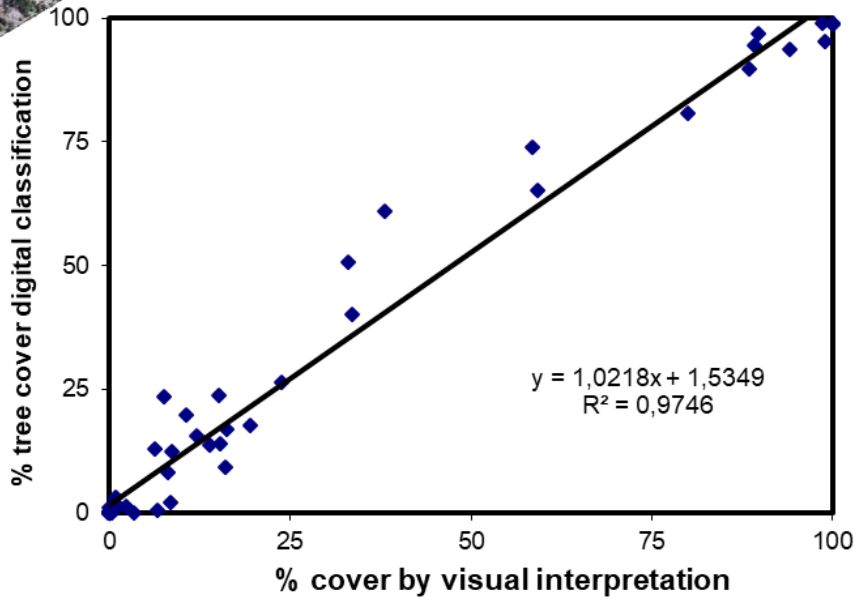
Calibration of Colophospermum Mopane with plant volume



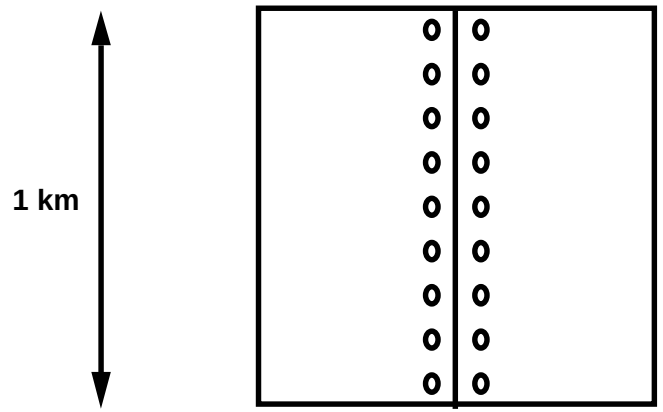
Extraction of Tree canopy cover density from Drone imagery

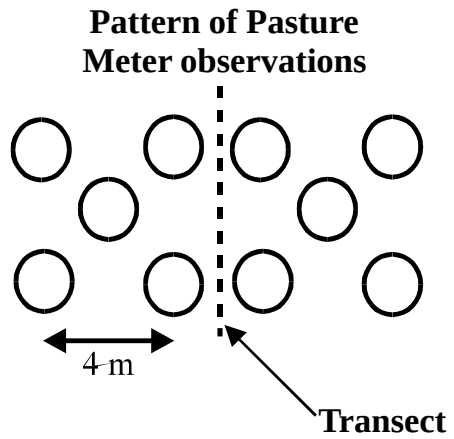


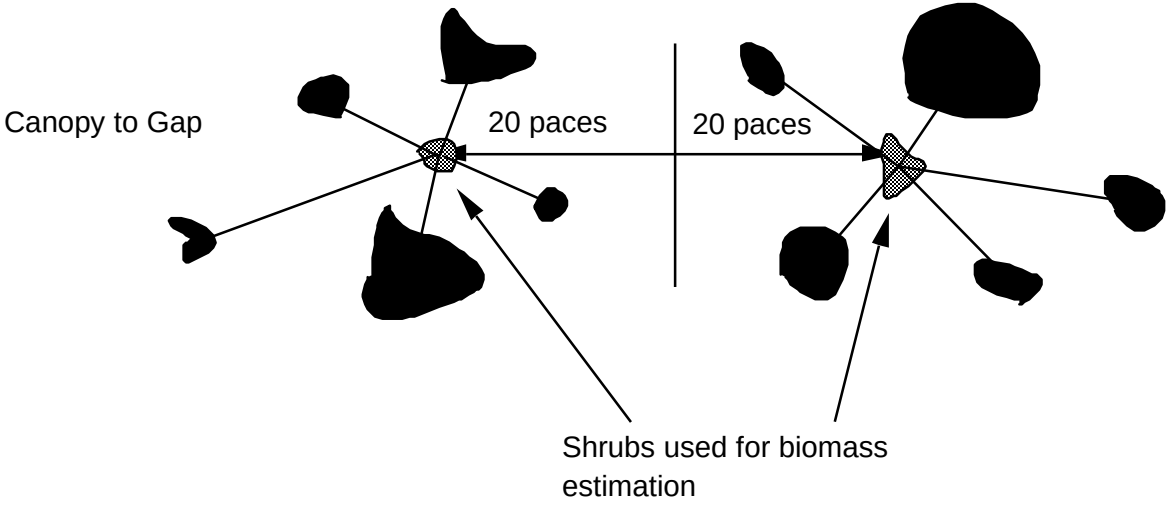
Parameters such as crown cover are easier to estimate remotely



Site sampling strategy

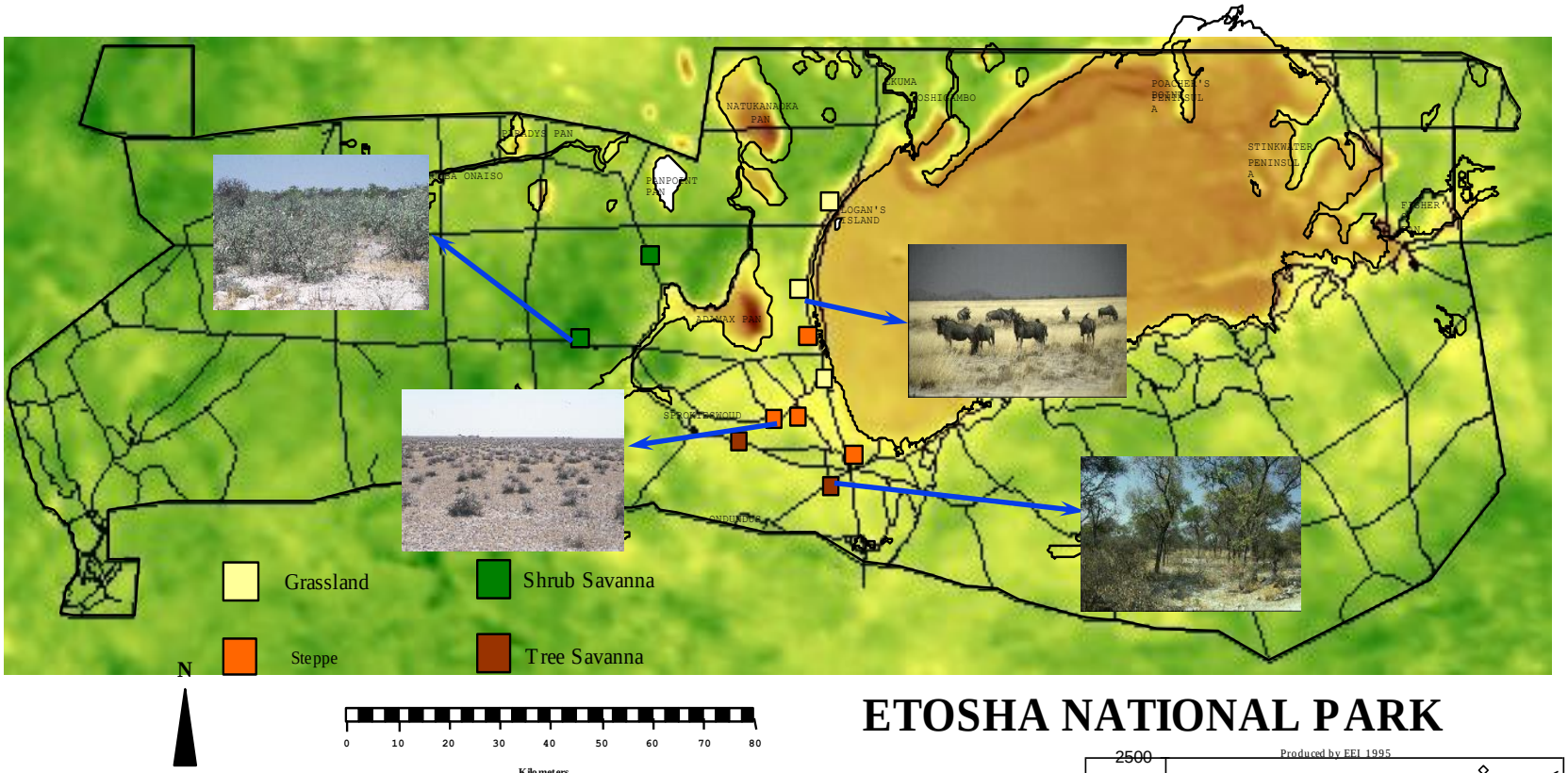






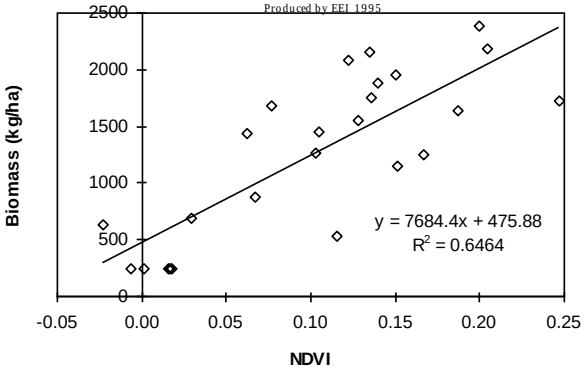
Biomass Assessment

Satellite Calibration



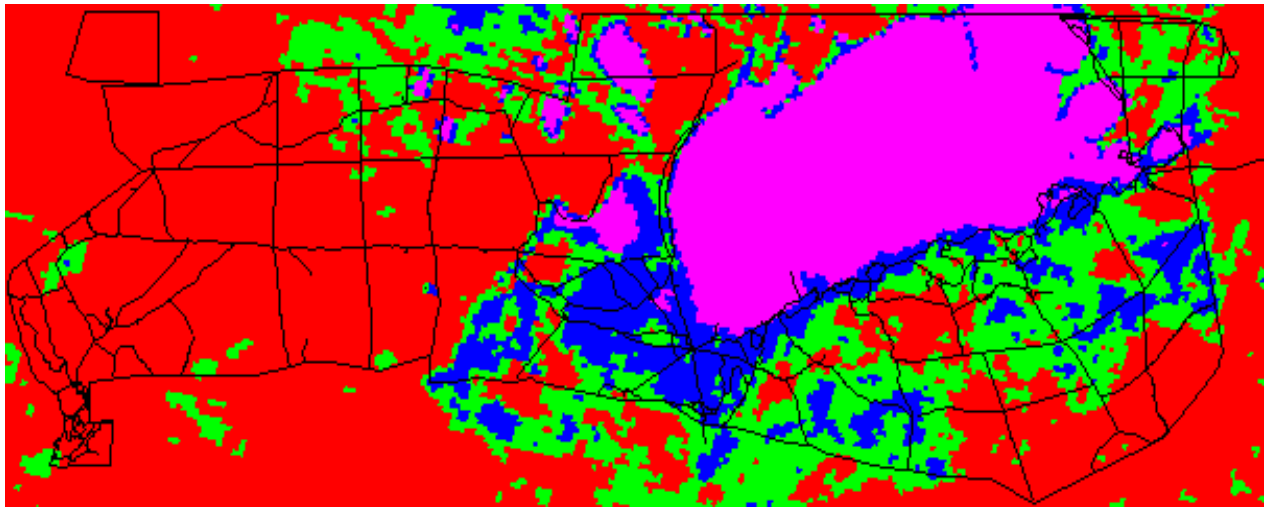
ETOSHA NATIONAL PARK

Ground observations are related to satellite images acquired at around the same date to derive a relationship between Green biomass and satellite data.



Fire risk assessment

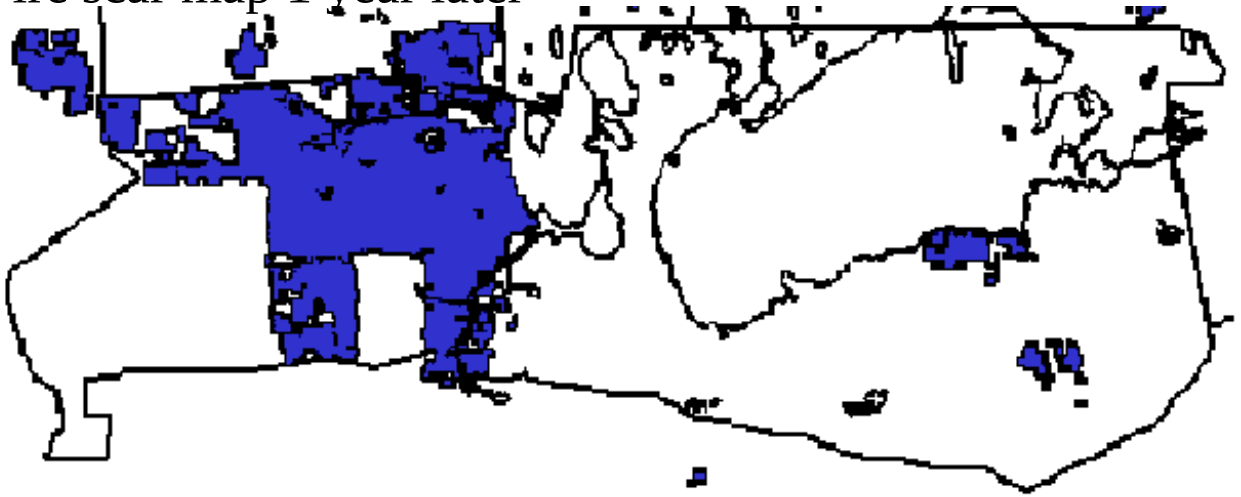
Biomass map



Levels of risk

- **Very low risk <500kg/ha**
- **Low risk 500 to 1250kg/ha**
- **Moderate risk 1250 to 1750kg/ha**
- **High risk >1750kg/ha**

Fire scar map 1 year later



- **Area burnt**

Main findings

- Rapid methods to collect biomass data were developed
- Uncertainty of field data can be assessed
- Successful development of quantitative techniques for assessment of green biomass

INT. J. REMOTE SENSING, 2002, VOL. 23, NO. 1, 71–89

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Taylor & Francis Group

Real-time monitoring of vegetation biomass with NOAA-AVHRR in Etosha National Park, Namibia, for fire risk assessment

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