## Table 17 Mangrove (% cover)

	DATA OPTION 1:	DATA OPTION 2: Radarsat TerrsarX or	DATA OPTION 3: Quickbird 2
	SPOT XS	ALOS Palsar	
Spatial Dimensions			
Area to cover	185 km x 185 km per	Up to 3600 km <sup>2</sup>	12 km x 12 km per
Mapping unit	15 m panchromatic	5 m -60 m	Stelle
	30 m multi-spectral		068m panchromatic 4.0 m multi-spectral
Positional accuracy	Depends on level of Geo-referencing	Dependent on Geo-referencing	Dependent on georef-
Temporal Dimensions			
When	Approx 9.45 am	Approx 11 am	Approx 10.45 am
How often	every 16 days	Minimum every 4 days	Minimum every 4 days
Variable to map	Mangrove cover	Mangrove cover	Mangrove cover
	(horizontal foliage	(horizontal foliage	(horizontal toliage
Environmental /	Cloud cover		
Sensor Restrictions		Mangrove fringe can be	Cloud cover
	Mangrove fringe can	narrow, smaller then	Managene friende oan he
	then pixel size		narrow smaller then
		Standing water on leaves	pixel size
		of mangroves	
Processing	Image classification or	Image classification or	Image classification or
technique	feature detection	feature detection	feature detection
(Output)	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and output	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and output
	extent.		
Resources –	PC	PC	PC
Hardware	Image processing	Image processing	Image processing
and Software	GIS with image	image analysis	GIS with image
	classification module	capabilities, including	classification module
	(e.g. ARCGIS Image	sub-pixel mapping	(e.g. ARCGIS Image
Basauraa	Analyst)	techniques.	Analyst)
Personnel	classification	processing	classification
	Experience with	Knowledge of area to be	Experience with high

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	Landsat data Knowledge of area to be mapped	mapped	spatial resolution data Knowledge of area to be mapped
References:	Liu et al (2008)	Lucas et al (2007)	Held et al. (2003) - CASI
Note these are some	Jensen (1991)	Simard et al (2006)	Wang et al. (2004)
example references	Green et al (1998)		

Green, E., C. Clark, P. Mumby, A. Edwards, and A. Ellis, (1998). "Remote sensing techniques for mangrove mapping." International Journal of Remote Sensing 19, 935-956.

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## Table 18 Mangroves (Extent)

	DATA OPTION 1: Landsat ETM	DATA OPTION 2: Airborne hyper-spectral data	DATA OPTION 3: Quickbird 2
Spatial			
Dimensions			
	185 km x 185 km per	Up to 1000 km <sup>2</sup>	12 km x 12 km per
Area to cover	scene	0.5m .5m	scene
Manning unit	30 m multi-spectral	0.511 – 511	068m panchromatic
mapping unit			4.0 m multi-spectral
	Depends on level of Geo-	Dependent on	
Positional	referencing	Geo-referencing process	Dependent on georef-
accuracy			erencing process
Temporal Dimensions			
When	Approx 9.45 am	User defined	Approx 10.45 am
How often	every 16 days	User defined (can be < 1 day)	Minimum every 4 days
Variable to map	Mangrove (species, cover, biomass)	Mangrove (species, cover, biomass)	Mangrove cover
Environmental / Sensor Restrictions	Cloud cover Mangrove fringe can be narrow, smaller then pixel size	Strong winds, Cloud cover	Cloud cover Mangrove fringe can be narrow, smaller then pixel size
Processing technique	Image classification or feature detection	Image classification or feature detection	Image classification or feature detection
(Output)	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.
Resources – Hardware and Software	PC Image processing software GIS with image classification module (e.g. ARCGIS Image Analyst)	PC Image processing software with Hyper-spectral analysis capabilities, including sub- pixel mapping techniques.	PC Image processing software GIS with image classification module (e.g. ARCGIS Image Analyst)
Resource – Personnel References:	Trained in image classification Experience with Landsat data Knowledge of area to be mapped Liu et al (2008)	Trained in hyper-spectral data processing. Knowledge of area to be mapped Lucas et al (2007)	Trained in image classification Experience with high spatial resolution data Knowledge of area to be mapped Held et al (2003)

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Note these are some example	Jensen (1991) Green et al (1998)	Simard et al (2006)	Wang et al (2004)
references			

Green, E., C. Clark, P. Mumby, A. Edwards, and A. Ellis, (1998). "Remote sensing techniques for mangrove mapping." International Journal of Remote Sensing 19, 935-956.

Held, A., C. Ticehurst, L. Lymburner, and N. Williams, (2003). "High resolution mapping of tropical mangrove ecosystems using hyperspectral and radar remote sensing." <u>International Journal of Remote Sensing</u> 24, 2739-2759.

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Simard, M., K. Zhang, V. Rivera-Monroy, M. Ross, P. Ruiz, E. Castaneda-Moya, R. Twilley, and E. Rodriguez, (2006). "Mapping height and biomass of mangrove forests in Everglades National Park with SRTM elevation data." <u>Photogrammetric Engineering and Remote Sensing</u> 72, 299-311.

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## Table 19 Mangroves (Species)

	DATA OPTION 1:	DATA OPTION 2:	DATA OPTION 3:
	Landsat ETM	Airborne hyper- spectral data	Quickbird 2
Spatial Dimensions			
Area to cover	185 km x 185 km per scene	Up to 1000 km <sup>2</sup>	12 km x 12 km per scene
Mapping unit	15 m panchromatic 30 m multi-spectral	0.5m – 5m	068m panchromatic 4.0 m multi-spectral
Positional accuracy	Depends on level of Geo-referencing	Dependent on Geo-referencing process	Dependent on georef- erencing process
Temporal Dimensions			
When	Approx 9.45 am	User defined	Approx 10.45 am
How often	every 16 days	User defined (can be < 1 day)	Minimum every 4 days
Variable to map	Mangrove (species, cover, biomass)	Mangrove (species, cover, biomass)	Mangrove cover
Environmental / Sensor Restrictions	Cloud cover Mangrove fringe can be narrow, smaller then pixel size	Strong winds, Cloud cover	Cloud cover Mangrove fringe can be narrow, smaller then pixel size
Processing technique	Image classification or feature detection	Image classification or feature detection	Image classification or feature detection
(Output)	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.
Resources – Hardware and Software	PC Image processing software GIS with image classification module (e.g. ARCGIS Image Analyst)	PC Image processing software with Hyper- spectral analysis capabilities, including sub-pixel mapping techniques.	PC Image processing software GIS with image classification module (e.g. ARCGIS Image Analyst)
Resource – Personnel	Trained in image classification Experience with Landsat data Knowledge of area to	Trained in hyper- spectral data processing. Knowledge of area to be mapped	Trained in image classification Experience with high spatial resolution data Knowledge of area to be

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	be mapped		mapped
References:	Green et al (1998)	Lucas et al (2007)	Wang et al (2004)
Note these are some		Held et al (2003)	Kovacs et al (2005)
example references			

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## Table 20 Mangroves (Biomass)

	DATA OPTION 1:
	Radarsat, TerrsarX or ALOS Palsar
Spatial Dimensions	
Area to cover	Up to 3600 km <sup>2</sup>
Mapping unit	5m -60mm
Positional accuracy	Dependent on Geo-referencing process
Temporal Dimensions	
When	Approx 11 am
How often	Minimum every 4 days
Variable to map	Mangrove cover (horizontal foliage projected cover
Environmental / Sensor Restrictions	Mangrove fringe can be narrow, smaller then pixel size Standing water on leaves of mangroves
Processing technique	Image classification or feature detection
(Output)	(Vegetation type map and target features) Note: The ability to map specific targets will depend on their growth form and extent.
Resources –	PC
and Software	software with radar image
	analysis capabilities, including sub-pixel mapping techniques.
Resource – Personnel	Trained in radar data processing. Knowledge of area to be
References:	Παρμεα

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Note these are some	Held et al (2003)
example references	Lucas et al (2007)
	Simard et al (2006)

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