4.1.2 Comparison of the various remote sensing sensors.

Table 19 gives an evaluated summary for the various remote sensing sensors using categories of good, medium or poor for indicating user-friendliness as well as high, medium or low effectiveness in the indication of rehabilitated wetland indicators. Images from all high resolution sensors are more or less time consuming because of the data size. Seamlines in the mosaics are a result of the applied image processing techniques and software. This can drastically be reduced with different image processing techniques and software. All other processing and classification is nearly the same as for satellite imagery. The cost of well-trained staff, transport, equipment and data-processing facilities are often neglected or underestimated.

The different remote sensing sensors, SPOT 5 and Kodak DCS 420, Near infrared, (Figure 136 to 139) and EROS and DuncanTech CIR (Figures 140 to 146), are visually compared with each other.

4.1.2.1 Comparison of SPOT 5 and Kodak DCS 420.

A comparison between SPOT 5 and Kodak DCS 420 (Near infrared) images at the Kromme River Wetland rehabilitation structure 5 shows the extent of the difference in detail. Various wetland rehabilitation indicators and structures (gabion structure - Figure 136 and sedimentation - Figure 137) are vague in Figure 138 (SPOT 5), but clear and evident in Figure 139 (Kodak DCS 420, Near infrared). It gives a good indication of the level of detail these sensors are capable of.

Table 19: Evaluation summary for the various remote sensing sensors using [illegible]**m and Poor for indicating user friendliness, Short, Medium, Long indicating data processing time as well as High, Medium and Low effectiveness in the indication of indicators.**

Sensor	Landsat	SPOT 5	EROS	Kodak DCS 420 (Near Infrared)	DuncanTech CIR
Resolution	30 m	10 m	1.8 m	1 m	0.25 – 0.5 m
Image cover area	185 x 185 km	60 x 60 km	12.5km x 12.5km		
***Total Cost (R/ha) covering wetland area**	R 6.15 / ha	R82.00 / ha	R12.90 - R36.10 / ha	R59.34 / ha	Average R287.71 / ha
***Total Cost (R/ha) covering rehabilitation structures**	R166.00 / ha	R804.23 / ha	R311.00 – R350.00 / ha	R 582.00 / ha	Average R301.97 / ha
Availability of data	Good	Good	Good	Good	Good
Quality of data	Good	Good	Good	Medium	Good
Data processing time	Short	Short	Short	Long (Time consuming)	Medium
Sensor characteristics					
• **Strengths**	• 8 Bands (different classifications) • Readily available (due to cloud cover not always on specific date) • Good for regional mapping	• 4 Bands • Readily available (due to cloud cover not always on specific date) • Good for regional mapping	• Resolution • Readily available (due to cloud cover not always on specific date) • Cheap cost • Good for regional mapping	• Effective in mapping all the wetland indicators and structures • The primary reason for using red (R) and near-infrared (NIR) wavelengths is there usefulness for monitoring vegetation • Quality and availability of data is good • Resolution • Cost	• Effective in mapping all the wetland indicators and structures • Produce images with green, red, and near IR bands ideal for vegetation mapping. • The imaging sensors are sensitive to wavelengths (400 nm to 1100 nm).
• **Limitation**	• Coarse resolution • Minimum of ¼ sene available • Expensive for small areas	• Very expensive • Resolution is to coarse	• Only one panchromatic band is available (no colour) - Not ideal for mapping vegetation.	1. The image mosaic covering the study area consisted of 47 separate images. A seamless mosaic was considered to be important. 2. The differences in the pixel values are a result of the different exposure values of the images.	1. Datasets being very big and processing time being relatively long. 2. Expensive for relative small areas. Becoming available and competitive on areas 1000 ha and more. 3. Dependent on weather conditions 4. Logistics (Airplane, camera crew)
High, Medium and Low effectiveness in the indication of indicators.					
• Erosion	Low	Low	edium	High	High
• Sedimentation	Low	Low	edium	High	High
• Open water	Low	Low	edium	High	High
• Wet surface area	Medium	Medium	edium	High	High
• Water quality	Low	Low	w	Low	Low
• Wetland vegetation	Medium	Medium	w	High	High
• Terrestrial vegetation	Medium	Medium	w	High	High
• Alien vegetation	Medium	Medium	w	High	High
• Bare soil	Medium	Medium	edium	High	High
• Cultivation	Medium	Medium	edium	High	High
Rehabilitation structure	Low	Low	edium	High	High
Alternatives	A resolution merge between the best 3 bands form Landsat data and an EROS image (resolution 1.8 m) will enable visual inspection of the rehabilitation structures (medium effectiveness) and the vegetation with high effectiveness.	Panchromatic band with 2.5 m (resampled) resolution is available that could be used with the multispectral data to map the structures in more detail.	ROS together with other ltispectral data avelengths bands 0.52-90) with lower resolution 5 meters or better) could be ed with success in getation mapping.	PAR – Photosynthetic Active Radiation LAI – Leaf Area Index Spectrometer Soil moisture meter Vegetation Temperature	

* Refer to Table 15

Comparison of SPOT 5 and Kodak DCS 420 images: Krone River wetland - site 5.

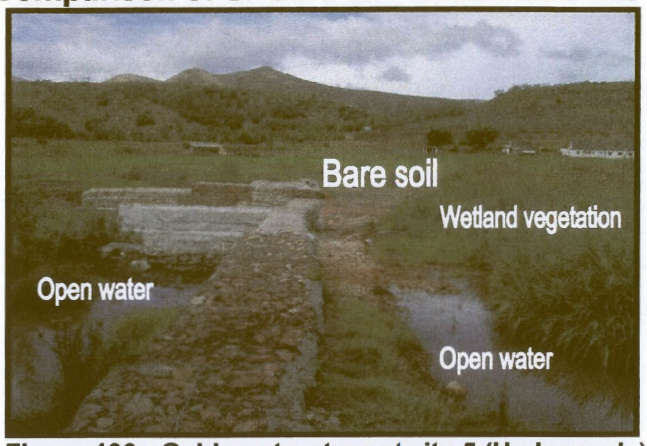

Figure 136: Gabion structure at site 5 (Hudsonvale) of the Kromme River Wetland.

Figure 137: Sedimentation downstream of the gabion structure at site 5.

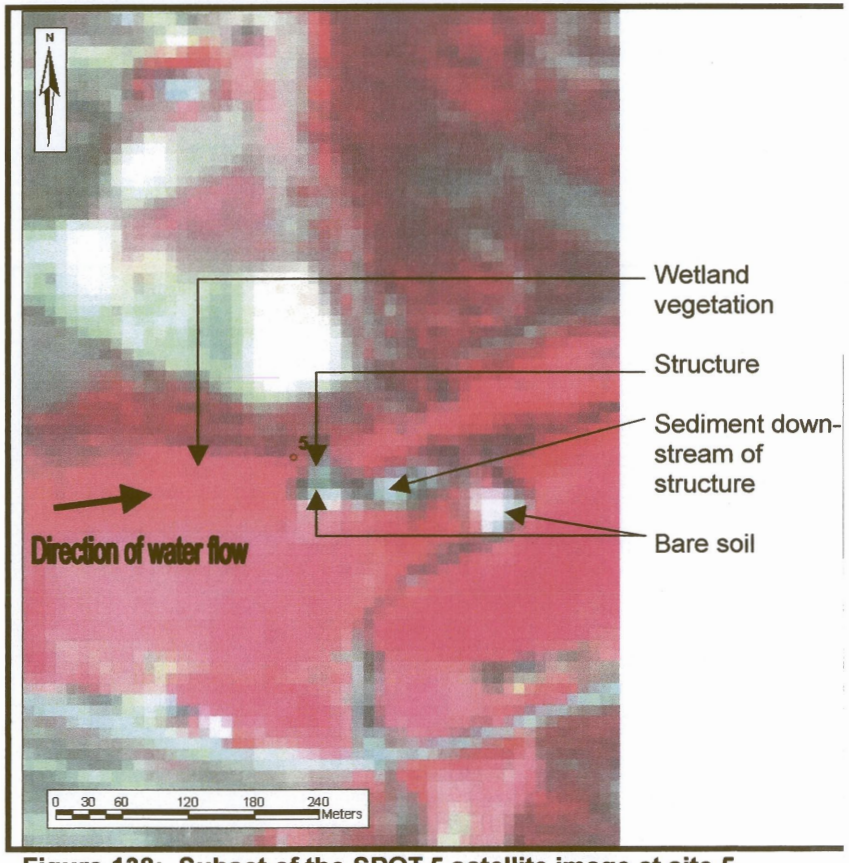

Figure 138: Subset of the SPOT 5 satellite image at site 5. Resolution: 10 m. Acquisition date: 10/02/2003.

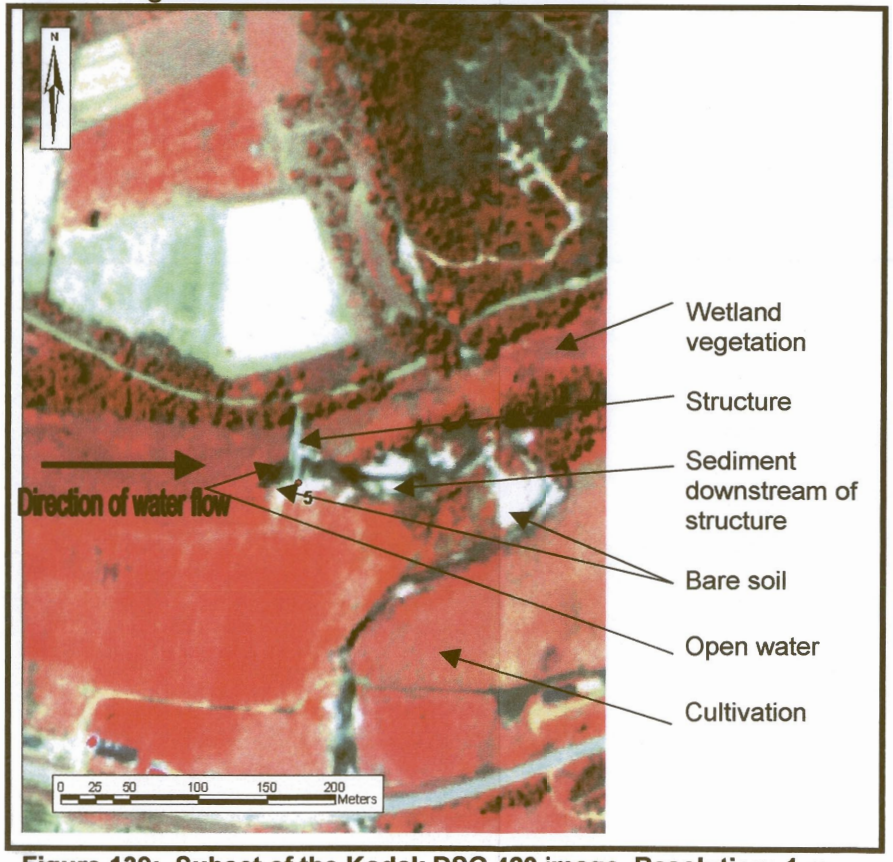

Figure 139: Subset of the Kodak DSC 420 image. Resolution: 1 m. Acquisition date: 22/01/2003.

4.1.2.2 Comparison of EROS and DuncanTech CIR.

A comparison between EROS and DuncanTech CIR images of the Amatigulu site at the Mbongolwane Wetland shows the extent of the difference in detail. Various wetland rehabilitation indicators and structures (headcut erosion - Figure 140; subsistence farming – Figure 142; harvesting of reeds – Figure 143 and diversion furrow - Figure 146) are vague in Figure 141 (EROS), but clear and evident in Figure 145 (DuncanTech). It gives a good indication of the level of detail these sensors are capable of.

Comparison of EROS and DuncanTech CIR images: Mbongolwe – Amatigulu.

Figure 140: Headcut erosion feature. Geocell chute preparations.

Figure 143: Harvesting (*Phragmites australis*).

Figure 144: Subset of the DuncanTech CIR image At the Amatigulu site.

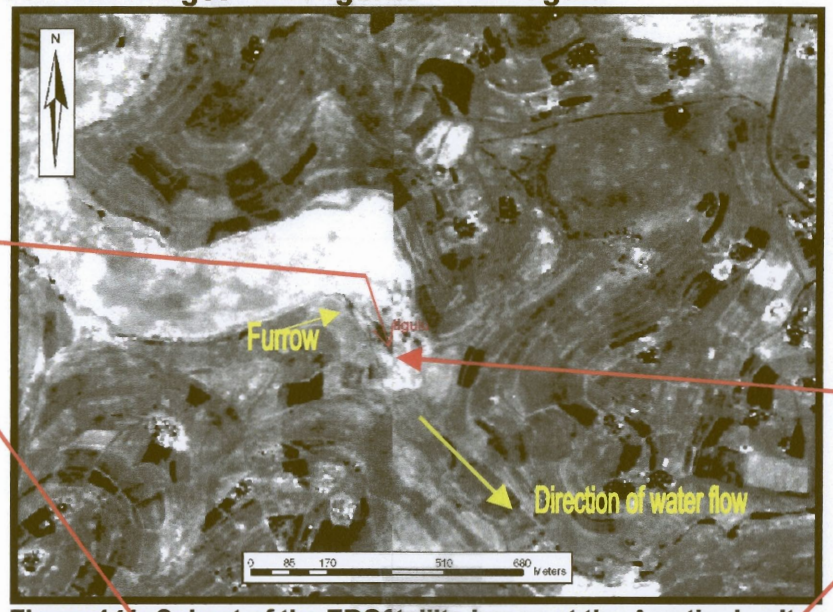

Figure 141: Subset of the EROStellite image at the Amatigulu site Resolution: 1.8 m. quisition date: 24/12/2002

Figure 142: Subsistence farming.

Figure 145: Subset of the DuncanTech true colour image at the Amatigulu site. Resolution: 0.25 m quisition date: 09/06/2003.

Cultivation
Commercial
Subsistence farming

Figure 146: Furrow diverting water away from the erosion feature for construction purposes.

4.2 LIMITATIONS AND RESTRICTIONS.

- The literature search involved inquiries with a time delay awaiting a response. In some cases no responses were received.
- Due to unforeseen circumstances and unsuitable flying weather the acquisition date of the DuncanTech imagery was not optimal in terms of the seasonal wetland characteristics.
- It was difficult to distinguish between sugar cane farming and grassland with wetland vegetation in study areas where the image acquisition date was not optimum for mapping the wetland vegetation (Mbongolwane, Zoar and Rietvlei wetlands).
- It was difficult to distinguish between wetland vegetation and the re-growth of alien vegetation in the Kromme River wetland. This problem also occurred with the Featherstone Kloof imagery (L. Haigh, *pers. comm.*)