

12. EQUIPMENT

One of the major advantages of the RHP is that it does not require a huge financial investment in equipment. *The equipment your RHP will require, will largely depend on your RHP objectives, which indices you intend using and of course the budget.* Your initial investment in equipment will probably include the basic RHP equipment, SASS and IHAS equipment (primary RHP indices) which is relatively inexpensive. The equipment required for each index is detailed below.

12.1 BASIC RHP EQUIPMENT

- \$ Waders for the PMT staff - these should preferably be made of strong nylon of the type used by fly-fishermen. Chest waders are preferable, although some people prefer hip waders. Obtainable from most angling shops. **Caution!! Waders can cause drowning if they fill up with water. Take Care!**
- \$ Gloves - preferably elbow length. These are particularly useful to avoid contact with the river water if the site is polluted or in a bilharzia area.
- \$ Life jacket - should be worn by monitoring staff when sampling large or strongly flowing rivers as an added precautionary measure.
- \$ Water quality monitoring instruments: Basic essentials include a pH meter, Dissolved Oxygen meter and Conductivity meter (instruments are available which perform the latter two functions as well as temperature reading). Ideally, one set of each for each monitoring team. These instruments are available from suppliers of scientific and laboratory equipment.
- \$ Water sample bottles and preservatives - for chemical analysis of trace metals and other constituents. Contact the IWQS for more details.
- \$ A set of maps of your area - minimum 1:250 000 scale, but preferably 1:50 000 scale as well. These are available from the Government Printers or Surveyor-General.
- \$ Global Positioning Systems (GPSs). These are useful for recording exact locality details (altitude, longitude and latitude as well as date and time) of biomonitoring sites. A variety of models are available, some of which come with computer software which enables direct download of information from the GPS to the computer. Some models have navigational capabilities as well. They are relatively cheap (ranging from R1500 upwards) and available from suppliers of scientific and laboratory equipment.
- \$ Towel and hat (and don't forget the sunscreen!)
- \$ A supply of drinking water - long trips out in the field can be very thirsty work. Beware of dehydration!

12.2 EQUIPMENT FOR SAMPLING INVERTEBRATE FAUNA USING SASS4*

- \$ Standard SASS net (300X300mm with mesh size of 1mm) - these are being made commercially by "Catchem Biomonitoring" (see Organisations offering support to the RHP section for contact details) or can be made up privately. IWQS can supply a pattern for the net and a list of suppliers for the components. The net material should be durable and reinforced with double stitching. Make sure that the frame is rigid and preferably made of stainless steel. SASS work can be demanding! Two nets per monitoring team is sufficient.
- \$ Sorting trays (preferably white). The trays should white or a pale colour and of a suitable size (approximately 300 X 500mm and 120mm deep) so that the small animals can be seen amongst debris and stones. Ideally three sampling trays are needed for each SASS net as it is preferred that Stones-in-Current, Marginal Vegetation and Sediment samples can be analysed separately.
- \$ Forceps (medium size +/- 120 mm in length) - for catching small invertebrates, removing debris and sorting. Two pairs per team is sufficient, although it is useful to keep a couple of spare pairs as they are inclined to get lost.
- \$ Buckets - for carrying water to the sorting trays, preferably between 10-20 L capacity.
- \$ Magnifying glass or hand lens - for closer examination of the more minute invertebrate species. Two pairs

- per team is sufficient..
- \$ Stopwatch or timer - to ensure that the correct time is spent sampling and identifying the invertebrates. One per team.
- \$ Sample tubes and jars - for the preservation of animals to take back to the laboratory or to send away for further identification. Tubes can be made of glass or plastic. Keep at least one hundred tubes in stock and a sufficient quantity of jars.
- \$ Preservatives- ethanol (70-80% concentration) or formalin (**caution: handle with care!**). Take a litre of either into the field.
- \$ Waterproof labels to be placed inside the sample tube or jar.
- \$ SASS Score Sheets.
- \$ SASS4 manual.
- \$ Invertebrate photographic identification guide - contact IWQS.
- \$ Pencils.
- \$ Folding table and chair - makes analysing the sample a more comfortable experience.

See SASS4 Manual (Thirion *et al.*, 1995) for further information on invertebrate sampling equipment and preservation techniques.

* SASS5 is about to be launched. There may be some changes in the equipment required.

NOTE:

A small portable reference collection of preidentified invertebrates from your region is very useful for SASS4 field identifications. Each monitoring team should have one to assist monitoring personnel in obtaining consistent SASS identifications and become more proficient in the field.

Take an additional supply of fresh water (10L) to the field to pour into your SASS trays for sorting. This is useful if the river water is very murky (which happens after heavy rains) which can make spotting inconspicuous invertebrates in the SASS sorting tray difficult. Also, fieldwork can also be thirsty work!

12.3 EQUIPMENT FOR SAMPLING FOR FISH USING THE FISH ASSEMBLAGE INTEGRITY INDEX (FAII)

12.3.1 Electroshockers

The primary piece of equipment for the biomonitoring of fish communities using the FAII is an electroshocker. Electroshockers, as the name implies, function by emitting a strong localised electrical current into the water which temporarily stuns the fish, which can then be easily collected with a handheld net. There are a number of options available, depending on your budget.

A backpack electroshocker such as the DEKA 3000 is the ideal option . It consists of a backpack battery and transformer unit connected to pole which has a scoop net attached. The advantage of the backpack electroshocker is that it is relatively lightweight and only requires one person to operate. The disadvantage is that it can be a fairly expensive piece of equipment if imported. A number of different models are available from various overseas companies. Alternatively, battery powered electroshockers can also be made locally and more cheaply. Contact IWQS for further details.

Useful tip!

Keep a fully charged spare battery for your electroshocker with you at all times in the field. Also, a battery charger which fits into your vehicle's cigarette lighter is another useful accessory.

An alternative electroshocking device can be constructed which consists of two electrodes powered by a conventional generator. The advantage of this is that it is a much cheaper option and is fairly easy to build. However, it is much more cumbersome in the field, as the heavy generator needs to be physically carried to the sampling site. It also requires two people to operate (one to shock the fish and the other to catch them with the scoop net). Contact the Aquatic Research Section of the Mpumalanga Parks Board for further information.

NOTE:

There may be other options for building a suitable electroshocking device. It may be worthwhile to explore these, before committing yourself to any of the suggestions mentioned here.

Warning!! Electroshockers are dangerous pieces of equipment. Wear your waders at all times when using these devices as this insulates you from the electric current conducted by the water. Make sure that the emergency switch on the electroshocker is functioning properly.

12.3.2 Additional fish sampling equipment required

- \$ Buckets - for the holding of fish during sampling, preferably between 10-20 L capacity
- \$ Aquarium handnets - useful for catching fish while scoring
- \$ Sampling bottles- for preserving fish for later confirmation of identifications or to museum collections. Plastic bottles of various sizes with screwtop lids which seal well are usually used.
- \$ Preservatives Formalin is usually used. One part formalin added to nine parts fresh water **Caution!!** Formalin is highly toxic and possibly carcinogenic. Inhalation and skin contact should be avoided.
- \$ Fish Assemblage Integrity Index Scoring sheets
- \$ A guide to the freshwater fishes of southern Africa. Skelton's *Complete Guide to the Freshwater Fishes of Southern Africa* (Southern Publishers) is recommended.

12.4 RIPARIAN VEGETATION INDEX (RVI)

The Riparian Vegetation Index (RVI) requires very little in the way of equipment. The following is a useful list of accessories:

- \$ Plant Identification Guide
- \$ Botanical plant presses - useful for the collection of plant specimens for sending to herbaria for further identification.
- \$ RVI Score Sheets

12.5 EQUIPMENT REQUIRED FOR THE OTHER RHP INDICES

Apart from the Index of Habitat Integrity (IHI) - which requires a helicopter and video camera! - the remaining RHP indices (Invertebrate Habitat Assessment System (IHAS), Hydrological Index (HI) and Geomorphological Index (GI) only require the relevant score sheets and of course a pencil!

12.6 ADDITIONAL RHP EQUIPMENT TO CONSIDER

- \$ Digital cameras - for photographically recording the general condition of sampling sites. Images can be transferred directly into your RHP Rivers database. A number of models are available, varying considerably in price. It is preferable to obtain digital cameras that are fairly easy to use and do not require an in depth knowledge of photography to obtain images of a reasonable quality. Alternatively, ordinary cameras may also be used and the pictures can then be scanned electronically.
- \$ Dissecting microscope. This is useful if your RHP intends establishing a laboratory or has access to an existing laboratory. A dissecting microscope is indispensable for the identifying of invertebrates which could not be identified in the field. Several models are available such as Zeiss or Nikon. The bad news is that these imported pieces of high-precision equipment are expensive (in excess of R30 000).
- \$ Invertebrate keys and identification manuals are essential accessories if a dissecting microscope is to be purchased or your RHP has access to one. The WRC is currently producing a series of invertebrate guides in collaboration with the Dept of Freshwater Invertebrates at the Albany Museum. Also contact the IWQS for further information on these.

12.7 STORAGE AND MAINTENANCE OF EQUIPMENT

12.7.1 Storage

Your RHP equipment should be stored in a safe place, preferably under lock and key. Most of the equipment is highly specialised and will probably take a fair amount of valuable time to replace if lost or stolen. *Take care with your equipment!*

You may consider insuring your RHP equipment for theft, loss or damage, although given the nature of its use, this may be fairly expensive.

12.7.2 Maintenance

RHP equipment is often used under rugged and demanding conditions and hence requires regular maintenance to ensure that it performs optimally and produces reliable results. All equipment should be checked regularly for wear and tear. Waders should be checked for holes and repaired if needs be. SASS nets should be checked regularly for tears and be repaired if needs be. Repair kits are available. Water quality instruments (particularly pH meters) should be calibrated and serviced regularly. Fish electroshockers also require care and maintenance. Check the condition of the scoop net and batteries regularly and that switches and cables are functioning properly.