10. PROMOTION AND MARKETING

This is very important component of your RHP which can be easily overlooked, while attending to day-to-day practicalities. For your RHP to gain acceptance in your area, promoting it to the wider community who have an interest in water quality is essential. Achieving “stakeholder buy-in” will make successful implementation of your RHP that much easier. Promotion and marketing aimed at attracting funding for your programme is another important aspect to consider. The “what”, “how”, “why”, “when” and to “who” questions are useful starting points to formulate your RHP liaison, promotion and marketing strategy.

Your RHPs promotion and marketing strategy should aim to:

- **$** promote acceptance of your RHP amongst key clients and stakeholders
- **$** convince these groups of the value and benefits of the RHP
- **$** promote the use of information generated by the RHP in water resource management decisions
- **$** attract participation and/or funding for your programme
- **$** nurture a sense of responsibility and ownership of the RHP amongst these groups
- **$** promote the role that the RHP and biomonitoring can play in maintaining and monitoring the state of river systems
- **$** promote awareness and need for conserving aquatic ecosystems.

10.1 IDENTIFICATION OF CLIENTS AND STAKEHOLDERS

It is essential to know who the clients and stakeholders are so that your promotion reaches your intended target audience. This target audience will probably consist of a wide variety of people and organisations from equally diverse backgrounds. They will probably have one thing in common: an interest or stake in the rivers of your RHP. Manyaka Greyling Meiring (1998) have divided the potential target audience into different levels: political, implementation, stakeholder and information levels.

10.1.2 Your potential target audience should include

- **$** Government department officials (provincial and national departments.)
- **$** Municipal and district councils
- **$** Representatives from Industry (particularly mining, forestry and agriculture)
- **$** Potential funders or contributors to your RHP (including the above sectors)
- **$** Universities - several departments (eg biology or geography depts.) may be interested in participating in research relevant to the RHP
- **$** Non-governmental Organisations (NGOs) - existing structures in the community, which may serve as useful conduits to get the RHP message to people.
- **$** Conservation and conservancy groups (eg Wildlife and Environment Society of SA)
- **$** Local Communities with an interest in the river
- **$** Schools and youth groups such as Eco- and Conservation Clubs
- **$** River Fora and Water Users Associations are the building blocks for the Water Management Areas - which are scheduled to be run by Catchment Management Agencies. Depending on how developed these are in the area concerned, these are useful springboards for launching the RHP in your area.

10.2 CONTENT AND STYLE OF PROMOTIONAL AND MARKETING INITIATIVES

The content and style of your promotion and marketing initiatives will depend on what you intend promoting and to whom these are aimed at. It is important to include pertinent information in a way that is readily understood by your target audience in an interesting and appealing format.

The content should include the basic facts of the RHP such as:

- **$** background and origins of the RHP
- **$** objectives of the programme
- **$** description of the various biomonitoring indices and how they work
- **$** advantages of the RHP both provincially and nationally and why the programme is important
- **$** potential role players and how to get involved
- **$** key points from your implementation plan.

The style of presentation is also important and should be tailored to suite the intended audience. School groups will require a different level of information and presentation style to a corporate or government audience. Remember to use the corporate image of the RHP where possible (particularly the logo). This will help entrench the identity of the RHP with your audience.

To attract financial investment, the contribution of resources or skills and to encourage direct participation in the programme, requires advertising to "sell" your programme.

NOTE:
The level of detail, style of presentation and medium for which particular audience will ultimately be left to you to decide.

10.3 CHOOSING THE MEDIUM FOR PROMOTION AND MARKETING

The next challenging step is to choose the most effective method to get the RHP message across. Generally, one of the most effective ways to "penetrate the market" is by means of talks and practical demonstrations, preferably in the field. Demonstrating either SASS and FAII sampling techniques may be useful to garner support for your porgamme. Environmental Festivals and EcoForum meetings are useful events at which to introduce your programme. Including an environmental education component in your promotion strategy would be effective in reaching school and youth groups.

Other media options include:

- **$** RHP fact sheets (available from the RHP Communication Office of Manyaka Greyling (Pty) Ltd)
- **$** RHP newsletters and posters
- **$** local newspaper press-releases and magazine articles
- **$** word of mouth
- **$** radio and television coverage
- **$** press conferences have the potential to reach a wide audience
- **$** corporate RHP video would also be a valuable promotional and educational tool
- **$** RHP website (www.csir.co.za/RHP) - provincial initiatives and progress can be posted regularly on the website which has the potential to reach the global audience.

NOTE:
Manyaka Greyling Meiring (1998) have produced a draft of a Strategic External Communication Programme manual for the RHP. This document addresses the communication, promotion and liaison for the RHP. It also covers identifying key target audiences an how to arrange workshops, field demonstrations and open days and a range of other relevant topics. See section on organisations offering support to the RHP for more information.

11. PUBLIC PARTICIPATION

Public participation has been defined as A producing a process leading to a joint effort by stakeholders representing all relevant interests and sectors of society, technical specialists and the various relevant organs of state who work together to produce better decisions than if they had acted independently, and better implementation of decisions through stakeholders "owning the process" (Greyling and Manyaka, 1999).

Public participation (PP) is required under the National Water Act as an essential process for decision making regarding shared resources such as water. As the RHP is, by its very nature, a ***participative programme,*** some form of public participation is required to ensure "stakeholder buy-in" in your RHP. The ***"who", "what", "why", "when"*** and ***"how"*** questions should be addressed to inform and elicit feedback from stakeholders on how best to implement your local RHP.

Who should be involved in the PP process

Ideally, all stakeholders and interested and affected parties in the river catchment should be involved, i.e. people or organisations which have a vested interest in the river and are dependent on prevailing water quantity and quality. These include industries, farmers and local communities living near or within the catchment (see proposed "target audience" in the Promotion and Marketing section). Remember that representation of the different sectors is more important than obtaining the views of every individual living in the catchment (Figure 2).

Download diagram separately – quality of pdf diagram poor – apologies

Figure 1. Identifying stakeholders from each of the three dimensions of sustainability (economic growth, social equity, ecological integrity) (Greyling and Manyaka, 1999).

How should PP be conducted

The PP process should begin with a public announcement such as an advertisement in a newspaper calling for meeting to discuss your RHP. Depending on the circumstances, public meetings and open fora with local communities or one-on-one meetings with farmers and representatives from industry are PP options (Figure 3).

Your PP should include a presentation of the RHP to provide stakeholders and interested and affected parties with the necessary context of your RHP. The presentation could include a summary of your provisional Implementation Plan and RHP goals and options of how to get there. The various RHP indices should be explained or demonstrated.

Once the stakeholders are on board, the next step is the ***identification of problems and needs through consultation***. Through interactive dialogue, the PP should lead to "consensus building" and a convergence of thinking amongst stakeholders, and ultimately ***shared solutions.*** In other words, your RHP PP programme can play a pivotal role in bringing people from diverse backgrounds together through the common goal of water resource management.

Outcomes of meetings should be made available to all stakeholders so that the are kept informed of progress and developments. Ensure that meetings are properly minuted and that these are circulated to all present and absent stakeholders. Regular progress reports are another option.

When should PP be conducted

Regular PP should be an integral component of implementing your RHP. Consultation with stakeholders and interested and affected parties should be a part of your planning process and should continue on a regular basis, particularly when new developments are planned or expansion of the programme to additional river catchments is envisaged.

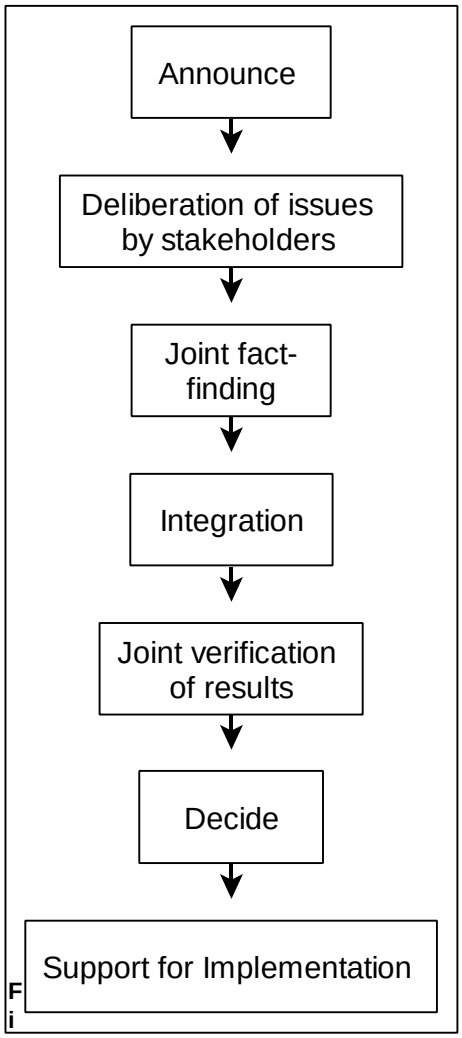

Figure 2. A model for public participation (adapted from Greyling and Manyaka,1999).

11.1 GUIDING PRINCIPLES FOR PUBLIC PARTICIPATION

- **$** Flexibility - accommodation of local needs and circumstances
- **$** Announcement of opportunity for involvement - ensuring that people have ample chance to become involved
- **$** Representivity - broadest range of participants should be involved
- **$** Sufficient and accessible information - language and level of information is important to meet the needs of the stakeholders
- **$** Opportunity for comment - a variety of media should be considered - e.g. verbal or written
- **$** Opportunity for exchanging views and information
- **$** Continuous feedback and acknowledgment - stakeholders should see that their contributions are being considered in the PP process
- **$** Respect for cultural and language preference - this should be considered at all times

- **$** Ability and interest levels of stakeholders - important to take into account when presenting information
- **$** Assigning roles and responsibilities of stakeholders - this should be done at the beginning of the process

- **$** Transparency, openness and honesty - this is essential to inculcate a sense of trust in the process amongst participants
- **$** Efficiency and effectiveness - both essential for the nurturing of stakeholder respect in the process
- **$** Independent facilitation - this may encourage stakeholder participation through the “neutral” facilitator.

Things to remember for public participation and the RHP

There is no prescribed recipe for fruitful public participation, however ***wide consultation, openness and transparency*** are some of the essential ingredients. How much public participation is necessary for successfully involving stakeholders in implementing your RHP will depend largely on your local circumstances and approach.

Stakeholders and potential participants will probably have widely diverse backgrounds and experiences. This diversity is great in many respects, but of course means that the enthusiasm and the degree of acceptance of the RHP will vary from person to person. Do not despair if at first there is resistance (particularly from older members and skeptics). Be patient and persevere! Practical demonstrations which actively involve your audience is a good way to overcome this.

Involving local communities in your RHP may not be that easy. Local communities will probably have expectations of a direct spinoff of the programme, such as jobs or free water. Be aware of this from the beginning and do not make empty promises.

As a RHP practitioner, you also need to be aware of the socio-cultural and knowledge gap that exists between you and local communities. Your RHP objectives probably do not coincide with the livelihood security priorities of the community.

For community involvement and support for your RHP from this sector, building relationships is imperative. Your approach and attitude is important for this. Respect for local customs and language should be maintained at all times.

Public participation is a ***a two way process***. River Health implementers stand to learn a lot from the public participation process, as farmers and members of local communities often possess a long-term and intimate knowledge of their river and will point to where they feel monitoring should be taking place. Other useful information may include possible sites to sample, historical and geographical aspects of the catchment - such as the effects of droughts and floods, whether there have been any recent major pollution events, local hazards and pitfalls associated with the terrain and of course who the friendly farmers are!

In return, the RHP will offer education and environmental awareness and information pertaining to the river to the various interested and affected parties and give local communities an opportunity to be involved in the management of their own water resources. Some of the interested and affected parties may wish to become more actively involved and eventually join your PIT or PMT. In such a way, public participation encourages ownership of the RHP.

For more on public participation, see Procedures for Provincial Implementation of the National River Health Programme. Chapter 4 - Development of Social Tools for the River Health Programme.

NOTE:
Contact Manyaka Greyling (Pty) Ltd for more information and assistance on public participation.

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 Nickon. 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 is performs optimally and produces reliable results. All equipment should be checked regularly for wear and tear. Waders should be checked for holes and repairedif 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.

13. VEHICLES

It is likely that many of your RHP sites will be off the beaten track with bad roads and bundu bashing being part and parcel of the average biomonitoring fieldtrip. Rainy conditions, mud and rough terrain are all pretty persuasive in making a bakkie (LDV) your first choice of vehicle. A 4X4 or 2X4 with good ground clearance is recommended. Diesel vehicles tend to be more economical fuel-wise in the long-run. The choice depends largely on your budget or which vehicles are readily available.

14. COMPUTER HARDWARE AND SOFTWARE

14.1 COMPUTER HARDWARE REQUIREMENTS

A dedicated server is a preferable means of storing and managing information electronically. Many organisations are currently using Windows NT operating system, although some organisations prefer Novell or the older Unix systems. To run these systems, the computer designated as the file server should have a pentium processor and substantial amount of hard disk space (additional SCSI drives can be fitted) and random access memory (RAM). Servers have the added advantage in that most have a back-up system (such as a tape drive) on which the invaluable information can readily be stored at set intervals. Consult your local IT experts for more information on this and of course the budget too!

Alternatively, if the server option is not feasible, a standard PC can be used to house the Rivers Database (see Rivers Database section).

14.2 SOFTWARE REQUIREMENTS

Basic software requirements include spreadsheet programmes such as Microsoft's Excel or Quatro Pro which can readily be interfaced with database programmes such as Microsoft Access or DBase. A number of other database programmes are available, which range considerably in price. However, costly database systems such as Oracle are not necessities for managing your RHP information.

14.2.1 Rivers Database

The Rivers Database has been specifically tailored for the RHP. It is very useful for the standardisation and harmonisation of RHP information storage and management, enabling results obtained from different RHP initiatives to be readily comparable. The Rivers Database consists of a data storage component (for the editing and viewing of data) and a query centre for data extraction underpinned by Microsoft Access database files.

It is also envisaged that the Rivers Database will be the means for transferring regional RHP information to the national RHP database housed by Southern Waters Ecological Research and Consulting in Cape Town. The Rivers Database could also potentially interface RHP initiatives with DWAF's Water Management System (WMS) which has been designed to house all water resource related information in South Africa. The Rivers Database is available from the IWQS and further information can be obtained from Southern Waters Ecological Research and Consulting. See NAEBP Report No11 "Rivers Database: A user manual" (Fowler *et al.,* 2000).

Minimum hardware and software requirements for the Rivers Database:

- **$** Operating system: Windows NT and Windows 98
- **$** Memory: minimum 64 MB RAM
- **$** Minimum Screen Resolution: 800x600
- **$** Software: MS Office Professional 97.

NOTE:
A runtime version has been developed for those users who do not have MS Access 97.

14.2.2 Geographical Information Systems (GIS)

Another application of RHP information is that of spatial representation and analysis. Because the RHP information has a spatial component, it is ideally suited to this type of application. Using a suitable database where longitude and latitude co-ordinates for sites are stored, the GIS programme plots these on an electronic map of the area. The advantages of GIS are manifold, including routine queries and statistical analysis and the production of thematic maps depicting sampling points and results (see reporting section) in relation to environmental information such as geology, topography, rainfall and land use.

ArcView and GeoMedia are two of the more popular GIS software packages being used in the environmental field. These can be obtained from Geographical Information Management Information Systems (GIMS) and Intergraph respectively, both based in Mid-Rand, Johannesburg. As these are imported from the US, prices are subject to exchange rates.

NOTE:
Although a wide range of GIS programmes are available, it is strongly advised that you choose a package that is compatible with those being used by other organisations in the environmental field. The reason for this is that most environmental databases (such as ENPAT) are designed for a particular GIS application and GIS programmes are notorious for their inability to convert from one format to another, which has the potential to make data sharing and exchange a very tedious process.

15. FUNDING YOUR RHP

Although a considerable amount of WRC and government money has been invested in the initial research and development of the RHP and its associated biomonitoring indices, the provincial implementation of RHP remains an unfunded mandate (not funded by the national RHP). Given the paucity of available funds at the provincial level, this may be a stumbling block. However, this need not be the case. Successfully attracting an initial injection of external funding for the purchase of equipment, training and marketing and promotion of your programme could hinge on the effectiveness of your business plan, marketing and promotion of your programme.

The greatest amount of funding is required initially for purchase of equipment, vehicles, training and skills development, promotion and local research and development. Remember that it is not necessary to obtain all the required funding for all the aforementioned aspects before embarking on your RHP.

15.1 POTENTIAL RHP FUNDING SOURCES

The following organisations may be approached to provide the initial investment to get your RHP rolling. These include:

- **$** Water Research Commission - particularly for research and development aspects.
- **$** Dept. Water Affairs and Forestry - may contribute seed money to purchase equipment.
- **$** Dept. Environmental Affairs and Tourism - may be in a position to do the same through the provincial environment affairs government department..
- **$** Your local Water Board - has a vested interest in monitoring the state of rivers from which it draws its water.
- **$** Local and District Councils - these organisations may contribute to the monitoring of sites which are important to them.
- **$** Overseas funders such as DANCED, European Union and a number of other organisations.
- **$** Local industries within the river catchment - may contribute funding for the monitoring of sites which are potentially being impacted by their activities.

NOTE:
For additional potential avenues of funding, contact the RHP National Co-ordinating Team (NCT). The NCT can assist in strengthening your RHP funding motivation. Also both DEAT and DWAF are focal points for overseas funding organisations and can be contacted in this regard.

In the long-term, the RHP will probably become a recognized programme of the relevant provincial environment affairs department by virtue of its objectives of monitoring environmental and ecological trends. The RHP's potential for contributing to the knowledge of the State of the Environment (SoE) is another strong motivation for these organisations to adopt and fund the programme. Similarly, the RHP should become integrated into the monitoring programmes of the regional DWAF department and a budget allocated to the programme. Once established, it is envisaged that the relevant CMA will assume the funding and management of the RHP.

16. PLANNING YOUR RHP

Planning your RHP goes hand-in-hand with R&D. It is essential that your plan be ***realistic*** and ***feasible*** which takes into account prevailing circumstances and practical limitations (such as budget constraints). The bad news is that there is no fixed or universal plan that is readily available. Hopefully this manual will assist you in formulating your RHP implementation plan by providing a list of potential ingredients for your RHP recipe to be successful.

Your RHP plan should cater for the ***initial pilot phase*** of the programme as well as ***full-scale monitoring***. A gradual phased approach is recommended as the safer and preferred route to successful implementation. The projected phases should be consistent with the short, medium and long term goals of your RHP. It should be borne in mind that the long-term goal of full implementation will probably take several years to achieve.

Two types of plans can be developed for your RHP, namely an ***implementation plan*** and a ***business plan*****.**

16.1 RHP IMPLEMENTATION PLAN

This is your ***guiding RHP tablet***, tailor-made by you and your PIT team for your area. It is an essential document which formalizes the programme and demonstrates to management and other organisations what your local RHP is about and why it is essential. It should basically address the ***five basic questions*** mentioned earlier - the "what, where, who, when and how" these will be applied to your local scenario. The plan should be dynamic, flexible and adaptable.

16.1.1 RHP Implementation Plan - key components

- **$** Goals - what your RHP aims to achieve
- **$** Methods - detailing the "how" component. Include important rivers to be monitored and which biomonitoring indices are to be used
- **$** Funding - attracting the necessary funding and how it is to be utilized
- **$** Participating organisations and responsibilities
- **$** The River Health Champion and Provincial Implementation Team (PIT) and roles and responsibilities
- **$** The Provincial Monitoring Team (PMT)
- **$** Training and skills development schedule - what kind of training and for who
- **$** Equipment and vehicles required - a detailed list of what is required and the associated costs
- **$** Public participation - through your CMA, River Fora, NGOs and local communities and schools
- **$** Other interested and affected parties - who and how could they become involved
- **$** Promotion and marketing - media and target audiences
- **$** Models and options for implementation
- **$** Phasing of the programme (pilot phase etc)
- **$** Key rivers to be sampled - the "where" component
- **$** Reference and monitoring sites - a detailed inventory of these
- **$** Sampling programme - where and how often and with which indices
- **$** Auditing and Quality Control - how is the quality of monitoring to be assured and maintained
- **$** Recording and management of information - where and how and computer hardware and software requirements
- **$** Monitoring and reporting - environmental trend analysis and information dissemination
- **$** Management actions for the PIT
- **$** Gant chart for RHP implementation - this is a graphical schedule of the essential components with an associated timeframe of each detailing when each of the components are scheduled to happen (Appendix 1).

NOTE:
In reality, unforeseen circumstances may conspire against the clearly thought out implementation plan. Do not be defeated and remember, DON'T PANIC! Your implementation plan is intended to be a basic guiding document and, like all maps, will not mirror the territory perfectly. It can be altered periodically to suit your changing needs periodically.

16.2 RHP BUSINESS PLAN

A business plan may be necessary if stakeholders are investing in your programme financially or where donor or additional funding from sponsors is being sought. To bolster their confidence in your RHP, such organisations require assurance that their money is being invested in a sound, well-planned project In a nutshell, the business plan ***demonstrates exactly how and where the money is to be spent***. Hence a good business plan may make the difference as to whether your RHP actually comes into fruition or not.

The business plan should ideally incorporate the key concepts of the Implementation Plan, but with greater emphasis on the financial aspects of your RHP. A brief motivation is also useful (see Appendix 2 for an example of the KwaZulu-Natal RHP business plan).

16.2.1 Business Plan - key components

- **$** Aims and Motivation - these are important to inform potential funding agencies about the RHP and its objectives and why it is necessary.
- **$** Methods - detailing the "how" component. Include which important rivers are to monitored and which biomonitoring indices are to be used.
- **$** Products - this tells the funding organisation or financial department what exactly the investment in the programme will produce.
- **$** Quality Control - how is the quality of programme's components to be assured and maintained.
- **$** Participating organisations and responsibilities - this includes the PIT and other interested and affected parties.
- **$** Training and skills development programme - what kind of training and for whom.
- **$** Equipment required - a detailed list of what is required and the associated costs.
- **$** Gant chart for RHP implementation- this is a graphical schedule of the essential components with an associated time-frame of each detailing when each of the components are scheduled to happen (see Appendix 1).
- **$** Funding and budget - the most important aspect of the business plan. A realistic costing forecast of your RHP is essential. This should divided into the following:
  - Capital costs - including equipment, vehicles
  - Staff - salaries and wages
  - Training and skills development costs
  - Marketing and promotion costs
  - Running costs - actual costs of taking samples, analysis and data capture and storage.

17. HOW TO START: "IMPLEMENTING" YOUR RHP IMPLEMENTATION PLAN

Right, now that you've gone through all the preparations, lets get down to the real business of doing the RHP. Where to start? A good place to begin is to revisit the goals and objectives set out in your implementation plan.

17.1 SELECTING A TEST RIVER CATCHMENT FOR THE PILOT PHASE

After careful study of the maps of your area and consultation during the R&D stage, you should have an idea of potential test catchments for the pilot phase. An initial "groundtruthing" survey of the selected rivers is part of the selection process . This will give you a "feel" for the area while choosing a test river catchment (or catchments) for the pilot phase.

Criteria to bear in mind while choosing a test river catchment:

- **$** suitability of the catchment from a RHP perspective - preferably with perennial flow and a range of sites from relatively pristine to impacted (for selection of reference and monitoring sites)
- **$** relative importance within your province or WMA - is the river important for water supply or conservation or possibly under threat from development or industry
- **$** proximity and accessibility - does it have a number of good access points.

17.2 SITE SELECTION IN YOUR TEST CATCHMENT

Once you've decided on your test catchment, the next step is to select your biomonitoring sites. Site selection is process of exploring and evaluating whether a potential site measures up to the criteria required for the biomonitoring you intend doing. Although this is theoretically an objective process, a subjective decision is often the result due to various practicalities. Two main categories of sites are required for your RHP, namely: ***reference*** and ***monitoring sites***.

Site selection can begin with looking at the relevant maps or if the aerial survey of the river was undertaken as part of the Index of Habitat Integrity, potential sites may have been identified from the air. Replaying the video may provide further confirmation of possible sites to be investigated. Consulting local residents, researchers, regional DWAF and District Council officials for sites to consider may also be useful (Figure 4). Other potential sites for consideration may emerge from the public participation process.

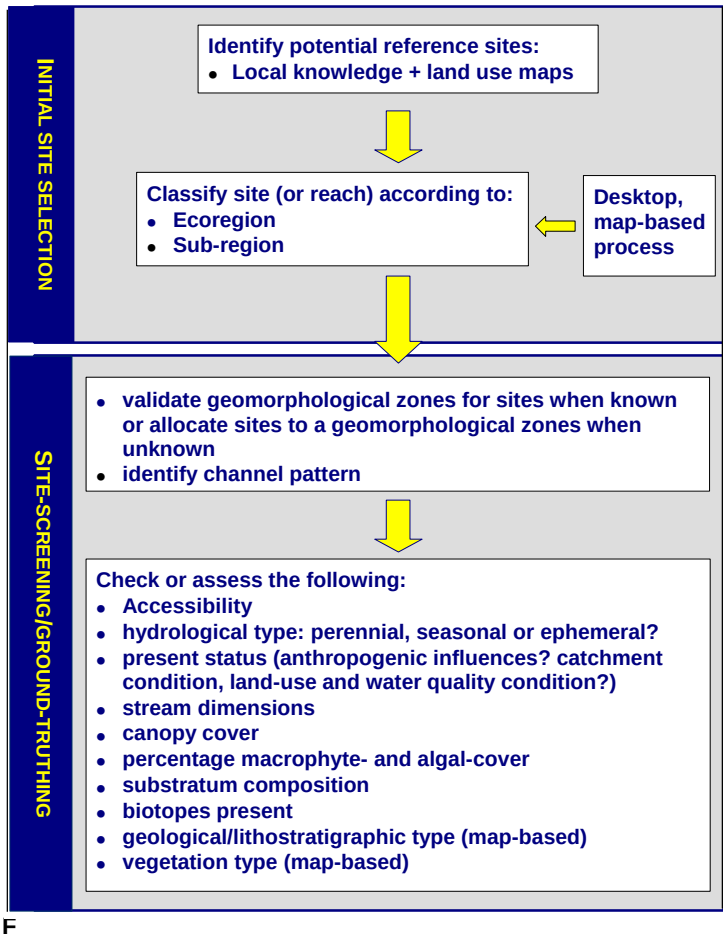

Figure 3. The site selection process (adapted from Dallas, 2000).

It should be borne in mind when selecting sites that the different RHP Indices have different site criteria. For example, SASS requires a diversity of biotopes (habitats) within a 20 m section of the river, while the FAII requires a “homogenous fish segment” of river which may by 100's of meters in length.

All sites should have ***good perennial flow***, with a ***wide range of available biotopes or habitats*** (particularly for SASS monitoring). Make sure that your potential sites are relatively ***accessible.*** In practical terms, this means that one can get fairly close to your site by road and to the water’s edge by foot within a reasonable period of time.

If one needs to enter private land, then make prior arrangements with the landowner and explain what you intend doing and why you need to enter the land. Failure to do so constitutes trespassing which not only shows lack of consideration, but may jeopardise future monitoring on the owner’s property.

Useful tip!
Another option to pursue is to consult with organisations which may have an existing monitoring programme in the test catchment, such as municipalities or district councils. Visit their monitoring sites to assess the suitability of these for biomonitoring. This has an added advantage in that the RHP can contribute another “layer” of information to an existing monitoring programme and vice versa.

Additional factors to consider for potential site evaluation:

- **$** The site’s position for the detection of possible water quality impacts in the test catchment from the surrounding land-use practices
- **$** Importance of the site for assessing water quality for human and other needs
- **$** Suitability for monitoring the recovery of the aquatic ecosystem after a major impact
- **$** Conservation importance of the site. Is it upstream or in a nature reserve?

All sites should be photographed and sampled to obtain initial results. This is an important component of the selection process, as site selection goes beyond just visual assessment.

Remember to inform the PMT about the selection process and which sites have been provisionally selected. It is recommended that members of your PIT then accompany the PMT members concerned and show them the sites and which biotopes to sample.

NOTE:
Selecting suitable sites may take time. It can be expected that conditions at prospective sites may change over time. Seasonal and natural fluctuations in water flow, catastrophic events such as floods and droughts and anthropogenic (human-induced) developments within the catchment will all affect the condition of the sites.

Ideally, sites should be assessed over the entire year to obtain an idea of site conditions during both the wet and dry season. For this reason, your first year of active biomonitoring will be partly devoted to assessing the suitability of your initial selection of sites.

17.2.1 Reference sites

Reference sites, as the name implies, are used to determine the “reference condition” against which results obtained from the monitoring sites can be compared. Hence it is imperative that these sites are relatively unimpacted (preferably pristine!) where water quality is deemed to be natural (or as close to natural as possible) with optimal aquatic ecological conditions. For SASS and IHAS reference sites, a wide variety of available biotopes (habitats such as stones, marginal vegetation, sediment) should be present (Figure 5).

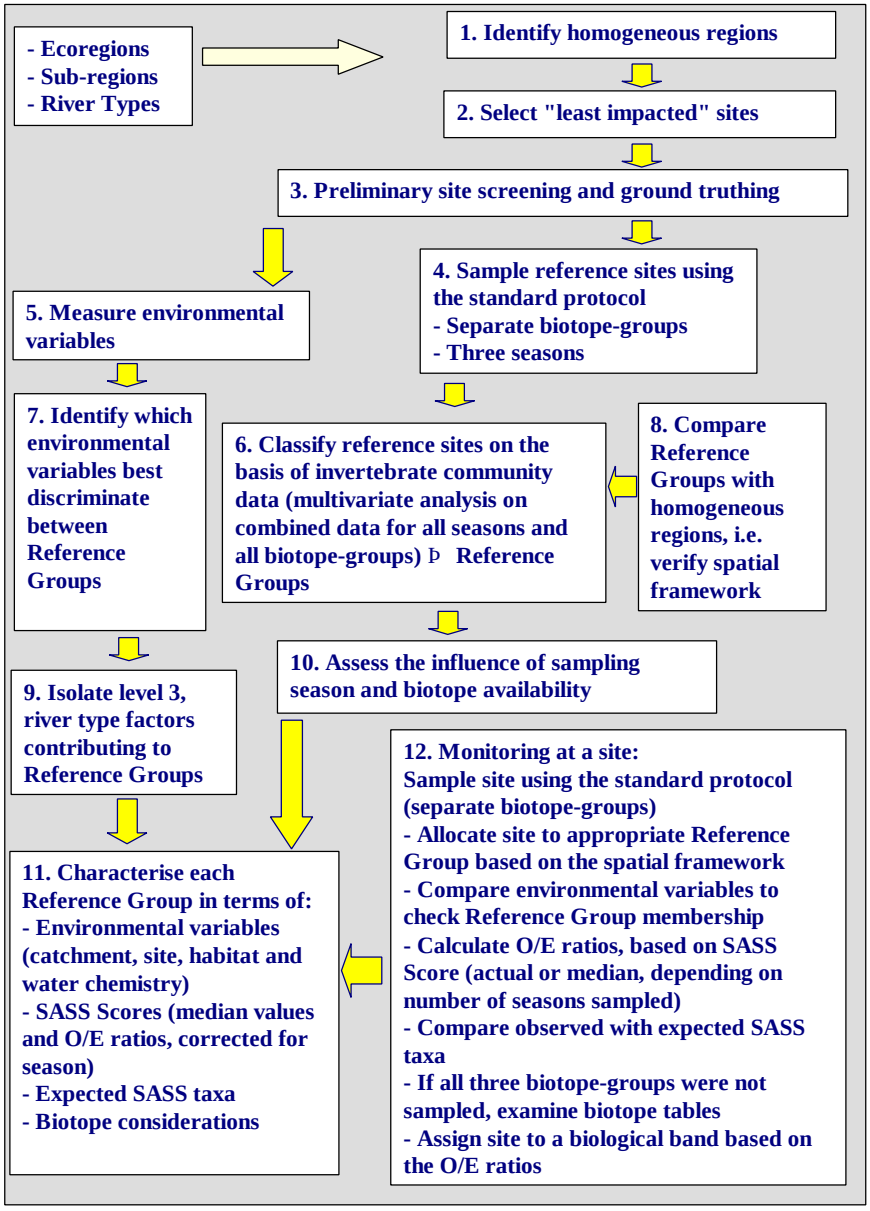

Figure 4. Proposed protocol for deriving ecological reference conditions for riverine macroinvertebrates (adapted from Dallas, 2000).

Preferably more than one reference site is needed per river and optimally one for each reach of the river i.e. near the source or unimpacted tributary of the river, in the middle reaches and lower reaches. However, as most unimpacted or pristine sites tend to be situated in the upper reaches of rivers, you may only be able to find one for each river in there.

NOTE:
In reality, it isn't easy to find such "ideal" sites in the field. So a good place to look for these is in nature reserves or protected areas if these are within your catchment. Sites on tributaries may also possess good reference characteristics.

17.2.2 Monitoring sites

Monitoring sites should ideally be randomly chosen to reflect the general range of ecological conditions within the catchment. Monitoring sites should be located so that the full range of the effects of the different landuses within the catchment can be evaluated. This is important to obtain objective information for state of the environment (SoE) reporting on environmental trends within the catchment.

Some monitoring sites may be intentionally chosen to assess the effects of specific environmental problems such as point-source pollution entering the river. In this case, they should be located as close as possible (both upstream and downstream) to potential points of impact such as industrial or mine effluents and confluences of rivers.

For more details on site selection, consult Eekhout *et al.* (1996) NAEBP Report No.3 and Dallas, H. F. (2000) NAEBP Report No.10.

NOTE:
There is no minimum or standard number of either reference or monitoring sites required for each river catchment. The number and quality of sites will be governed by the availability of suitable sites within the catchment (tributaries and main river included). Ideally, at least 10 monitoring sites should be considered for each catchment.

Once the PIT and PMT are satisfied with the preliminary selection of monitoring and reference sites, RHP experts may be consulted to verify the suitability of the initial site selection and assessment. A unique identifying number (or site code) should be allocated to each site once it has been "OKed" for inclusion into your RHP.

Baseline surveys of aquatic fauna and flora by experts are very useful for the initial stage of the programme. These provide a detailed benchmark inventory of biodiversity in your test catchment to which future monitoring results can be compared. This is particularly useful for the invertebrates, as there are often a wide variety of species in one river system.

NOTE:
A detailed initial "once-off" ecological assessment of conditions at each of the sites is needed for the Rivers Database. A standard form is available for this (see data storage and information management section).

18. MONITORING PROGRAMME AND SAMPLING FREQUENCIES

18.1 SELECTION OF BIOMONITORING INDICES FOR YOUR MONITORING PROGRAMME

There are currently seven RHP indices. Each of these indices is designed to measure a particular aspect of the health of the aquatic ecosystem, such as the invertebrates, fish, habitat, riparian vegetation and the geomorphological condition of the river channel (Table 18.1). Therefore, each RHP index has its own requirements regarding training, equipment application and frequency.

The selection of which RHP indices for the pilot phase of your programme will depend on your basic RHP objectives, budget, level of training and capacity and available resources. It is recommended that you start off with something manageable during the pilot phase (such as SASS4 and IHAS) and introduce some of the other indices as your programme develops from the pilot to the full implementation phase.

Table 18.1. RHP Biomonitoring indices.

Index	Brief description
Primary	
South African Scoring System (SASS4)	Monitoring of freshwater invertebrate communities, both diversity and abundance
Invertebrate Habitat Assessment System (IHAS)	Assessing the condition and availability of invertebrate habitats of the site being sampled
Secondary	
Fish Assemblage Integrity Index (FAII)	Monitoring of the composition of fish communities
Riparian Vegetation Index (RVI)	Monitoring of ecological condition of plant communities in and alongside the river
Tertiary	
Index of Habitat Integrity (IHI)	Aerial assessment of the overall condition of the river and catchment with respect to habitat availability and diversity, as well as surrounding land-use
Geomorphological Index (GI)	Assessing the physical condition of the river channel's morphology (prototype only)
Hydrological Index (HI)	Assessing the hydrological (FLOW) conditions of the river (prototype only)

18.1.1 Developmental status of the RHP Indices

Each of the above indices has undergone varying degrees of research and development for South African conditions. The most widely used biomonitoring index is the SASS, which has been in development since 1990 and version four (SASS4) has been in use since 1995. Version five (SASS5) is due for release.

IHAS has been in development for some time and is the descendant of forerunners such as the Habitat Assessment Matrix (HAM) and Habitat Quality Index (HQI). It can be applied with confidence along with SASS in all regions of South Africa.

The FAII has also been in development for several years and the current index's precursor was known as the Fish Community Integrity Index (FCII). The FAII has been applied successfully for rivers in the north-eastern parts of South Africa. Further testing and verification is required for other regions.

The IHI has also been tested in various regions in South Africa over a number of years. It can be applied with confidence at this stage.

The RVI is relatively new to the family of RHP indices. The initial RVI prototype has been tested successfully for some of the rivers of the Lowveld of Mpumalanga, but further testing and verification is still required for other regions of South Africa.

Only initial prototypes have been developed for the GI and HI at this stage. Testing and verification of these is still required.

For more information on the RHP indices, please consult the relevant literature.

18.1.2 Biomonitoring Protocols

NAEBP Reports Nos 6 and 8 explain a number of Biomonitoring Protocols (BP), which are proposed as different levels of biomonitoring using different RHP indices (Table 18.2). These range from BP 1 to 5 with a corresponding increase in the number and combination of indices.

Table 18.2. The range of Biomonitoring Protocols and associated indices.

Biomonitoring Protocol	Combination of Indices
BP1	SASS4 + IHAS
BP2	SASS4 + IHAS + FAII
BP3	SASS4 + IHAS + FAII + RVI
BP4	SASS4 + IHAS + FAII + RVI + IHI/HI
BP5	SASS4 + IHAS + FAII + RVI + IHI +HI + GI

The full implementation phase requires both a diversification in the number of catchments being monitored as well as the number of RHP indices being used. The progression from pilot to full implementation will probably be gradual and BP1-5 provides a useful means of assessing your programme's development for a particular catchment.

NOTE:
The combinations of indices in the aforementioned BP's are by no means compulsory as there is no prescribed recipe for which BP is best suited to which situation. The selection of the appropriate BP for your RHP largely depends on budget, time constraints, level of expertise and training and other logistical considerations.

18.2 MONITORING FREQUENCY

The RHP has been designed for the monitoring of long-term environmental trends in a practical and achievable way, even when resources are limited. As aquatic fauna and flora provide a long-term reflection of prevailing water quality and ecological conditions, biomonitoring demands less frequent sampling than chemical monitoring. This is one of the main advantages of biomonitoring and the RHP, particularly from a cost and logistical perspective.

NAEBP report no 8 proposes a biomonitoring frequency table for the RHP (Table 18.3). It is suggested that your RHP follows this, where possible. Both SASS and IHAS, should be conducted more frequently than the other indices. The reason for this is that invertebrates have a much shorter life span than fish or plants and hence are more responsive to changes in ecological conditions. Fortunately, these two indices are also the easiest and most rapid of the indices to perform!

Table 18.3. The application of biomonitoring indices and suggested monitoring frequencies.

Index	Monitoring frequency
South African Scoring System (SASS)	2-3 times per year - to be done with IHAS
Invertebrate Habitat Assessment System (IHAS)	2-3 times per year - to be done in conjunction with SASS
Fish Assemblage Integrity Index (FAII)	Every 2-3 years - to be done with RVI
Riparian Vegetation Index (RVI)	Every 2-3 years - to be done with FAII
Index of Habitat Integrity (IHI)	Every three to five years
Geomorphological Index (GI)	Initially once - to be repeated after major flood events which significantly alter the river channel
Hydrological Index (HI)	N/A

It is proposed that SASS and IHAS be conducted during the dry season, at the end of the dry season and at the end of the wet season. Ultimately though, the best monitoring times to perform these indices will largely be governed by local conditions.

Other factors which may affect your monitoring frequencies:

- **$** The biogeographical region in which you are launching the programme may play a role in determining your monitoring times during the year. For example, many of the larger rivers in Mpumalanga are flowing too strongly to sample effectively during the wet summer months. However, the opposite seasonal effect may occur for rivers in the Western Cape where peak river flows generally occur in July to September.
- **$** Apart from hindering monitoring activities, major floods can wash away habitat as well as much of the resident invertebrate communities. These will need some time to recover.
- **$** Certain activities and developments in the river catchment may also influence your monitoring routine, as with major pollution spills.

NOTE:
The recommended monitoring frequencies of SASS and the FAII may not co-incide with the length of the lifecycles of some of the organisms which these indices are striving to monitor. For example, the recolonisation of a site by aquatic invertebrates after a major catastrophic pollution spill can take as little as six and eight weeks.

It is suggested that if a major pollution spill has occurred in one of your RHP catchments, SASS, IHAS and FAII be conducted as soon as possible at the affected sites. If possible, both SASS and IHAS should be repeated two months later at these sites and the FAII six months later. Such ecological recovery biomonitoring may also be a component of a special monitoring programme separate from your RHP.