

Good communications are vitally important both within an MPA and between the MPA staff and stakeholders, and others outside the boundaries. Radio, telephone and internet are the primary forms of communication available to MPAs. Key principles in their selection and use are outlined in this sheet.

MPAs need good communication links with:

- MPA staff in vehicles or boats or undertaking other field activities;
- Local and national government offices, the Police and the Navy;
- Villages within or adjacent to the MPA;
- Visiting vessels (e.g. yachts, commercial shipping or fishing vessels);
- Oil spill task force and/or emergency response contacts;
- Other MPAs, donors, NGOs and other external organisations.

RADIO COMMUNICATIONS

Radio communication is based on the reception and transmission of signals (electromagnetic waves) that travel through the air in a straight line or by reflection from the ionosphere or from a communications satellite. The radio-wave spectrum is divided into eight frequency bands, ranging from very low frequency (VLF) with a long wavelength, to extremely high frequency (EHF) with a very short wavelength.

Commercial Wave Bands	Wavelength	Frequency
VLF - Maritime navigation signals.	10-100km	3-30KHz
LF - Navigational aids.	1-10km	30-300KHz
MF - AM radio, maritime radio.	100-1,000m	300KHz-3MHz
HF - Short wave (SW) radio, radiophone, weatherfax.	10-100m	3-30MHz
VHF - FM radio, navigational aids, TVs, walkie-talkie 2-way radios; most short-range services, e.g. aviation, shipping, police.	1-10m	30-300MHz
UHF - Cell phones, GPS, TVs.	10cm - 1m	300MHz-3GHz
SHF - Microwaves, space and satellite communications	1-10cm	3-30GHz
EHF - Radars and radio astronomy	1mm - 1cm	30-300GHz

The range of a radio unit is determined mainly by the frequency used and the transmission power of the set (measured in watts). Other factors are the height of the antennae, location of the base station, atmospheric conditions, time of year and even the presence of sunspots. A typical Marine MF/HF Radio Transceiver permits radio communications across many thousands of kilometres. VHF radios have much shorter ranges (a maximum of about 50 nautical miles off-shore to the coast) depending on the height of the antennae and obstructions in the line of sight between radio sets.

The VHF band is ideal for most MPAs. It is divided into 55 numbered channels, with Channel 16 set aside as the



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HF radios can be a vital link for remote MPAs or isolated communities such as this village in the Rufiji Delta, Tanzania, where electricity and phone lines do not reach.

standby channel for opening communications between different operators, before users switch to other selected channels. As the designated standby channel, with all users set to it when they are not on air, it is crucial for emergency communications. One of the main advantages of radio is that running costs are very low and it is usually long lasting.

Obtaining a radio frequency

The International Telecommunication Union (ITU) tightly regulates use of the radio spectrum to prevent interference caused by two users on the same frequency: there should be no duplicate frequencies within a 50km radius. A user is allocated a frequency band in which to operate, a transmitter radiation pattern and a maximum transmitter power. National agencies are responsible for regulating domestic radio links and selling licences. Annual fees are also paid to maintain the frequencies, as well as a fee (US\$40-80) for every radio in use on that specific frequency.

Repeater communications

A 'repeater' is a relay-base (often unmanned) located on elevated ground, with more transmission power than a single radio unit. It re-transmits messages by using radio waves on different frequencies (a frequency pair) thus transmitting and receiving simultaneously. A 'community repeater' is a repeater that uses different codes (either tones or digital) to separate users, thus allowing many users. By using a repeater station (and its antenna to gain height), the effective communication range of relatively low-powered sets is increased.

Radio components

Antennas - These are essential for transmitting and receiving signals, require power, and vary in length, with handsets and satellite transponders having the smallest.

Transmitter-receiver - this comprises an electronic circuitry of transistors, printed circuits and dials. Modern radios are programmable and only specialised technicians should open or alter radio settings and components.

Marine Radios - these are generally more expensive but are essential for boat use. The units are non-corrosive materials, and waterproof.

Power supply - Mains electricity, wind-up dynamos and batteries can be used. Handsets are powered by rechargeable batteries or use adaptors to connect to vehicles, 12V batteries and solar panels. Base stations normally take 240V mains power.

Radio maintenance and safety

Most radios do not require much maintenance, but an annual service by a qualified technician is recommended. The components should be kept clean and dry, and away from direct sunlight and heat. Rechargeable batteries last longer if they are regularly fully discharged. Electrical problems and lightning strikes are the main dangers but both can be prevented with qualified installation.

TELEPHONE

Fixed land telephone lines are cheapest and installation costs are generally low. Mobile, or cell, phone use is restricted by the location of the transmitter network, but is increasingly available, although it can be expensive. In remote areas with suitable satellite coverage, a satellite phone may be appropriate. These phones can be used anywhere, including in vehicles or boats but are expensive (user charges typically US\$ 1 per minute; purchase costs is between US\$ 500-1,000). Another potentially cost-effective option for low-quality voice communications is the Inmarsat-M communications service.

INTERNET

Email and the Internet allow remote locations to be connected to the rest of the world. Internet Service Providers (ISP), now available in most WIO cities, are companies that provide connections to the Internet and host email addresses. Connections to the Internet can be made by:

- **Fixed land telephone lines** - The cheapest option.
- **Mobile phone** - More expensive, and so not very suitable for Internet browsing. Weak mobile signals can sometimes be boosted locally within the MPA.
- **Short wave HF radio** - Suitable for email messages but not for large attached files or Internet access. This is particularly useful in remote locations due to the long range of short wave.
- **Broadband** - A high-speed Internet connection through phone lines (ISDN and ADSL) with a special modem, via a wireless link in the VHF band, or with a direct satellite link.
- **Direct satellite link** - Sometimes the only possibility in remote areas but expensive.

Sources of further information

Corfield, T. 1993. *The Wilderness Guardian: A Practical Handbook*. African Wildlife Foundation/The David Sheldrick Wildlife Trust. Longman, Kenya. 701pp.

Gale, J.M 1992. *Marine SSB operation*. Fernhurst Books, Brighton, UK. 96pp.

Companies providing wireless and telecommunications services and

relevant equipment: www.icom.com; www.motorola.com; www.multisource.co.za; www.kenwood.com; www.globalcoms.co.za

www.icom.com - commercial company giving information on creating websites and getting on-line

KEY POINTS FOR THE MPA

- Establish a communications system that adequately covers the MPA and beyond, and that incorporates the use of computers and relevant accessories.
- Provide training and opportunities for staff to obtain proficiency certificates (this is sometimes mandatory) in the use of radios.
- Establish a radio call procedure (e.g. limit usage to important exchanges of information only).
- Provide waterproof plastic cases for hand-held unit used on boats, and try to purchase marine models.

CASE STUDY

Use of radios in Menai Bay Conservation Area, Zanzibar

As part of a WWF-supported project, the Zanzibar Department of Fisheries has established a network of radio posts in the Menai Bay Conservation Area linking 19 villages within the MPA to the patrol base in Kizimkazi. The seven 'base' radios include several in villages, some powered by car batteries connected to solar panel, and others in a vehicle and a boat. These stations were initially operated by volunteers from village environment committees associated with the Conservation Area, and thus able to report potential violation of park regulations to Kizimkazi. Radio posts were strategically posted in villages with clear views of entry points to the MPA and were installed by a technician. Six hand-held radios were also bought for use on the fishing and patrol boats, providing a critical link with the radio base in case of emergencies, need for reinforcements, or for reporting on the location of alleged offenders.

Some lessons learned during the first phase of operations were:

- The radio network was appreciated by those villages involved who actively reported illegal activities and were able to use the network in case of other community needs such as reporting on death or sickness of community members.
- A speedy response was required since violators could quickly move on, but the radio network did not adequately cover the large MPA. Three additional patrol bases are therefore being established, and the hand-held units have helped.
- Compensation to radio operators made them more reliable and it is hoped that they will eventually receive a government salary.
- Although marine radios are better they have not been used, as the costs are higher and frequencies are not compatible with the terrestrial units that were purchased first.