**4.8. Example of population monitoring: waterbirds**

I – Wetlands are ecotones, areas of transition between water and land which diverse functions give them remarkable biological, hydrological, economical and sociological values.

G – In the MOOC on PA management, we’ve seen that wetlands face many threats (drainage, industrialisation, pollution, embankment, urbanisation…) which keep reducing their size.

I – According to the Ramsar Convention, waterbirds are species of birds that are “ecologically dependent upon wetlands”.

G – Here, we consider waterbird species a value of wetlands, and we will see how their attributes ought to be monitored, especially the diversity of species and their number of individuals per species.

I – Waterbirds are monitored because they are indicators of the quality of wetlands. Thus, according to the RAMSAR Convention, a wetland is considered globally important when it includes at least 1% of waterbird populations.

G – They can also be monitored because of their sustainable use for vision tourism or hunting.

I – Monitoring namely helps to draw up or update wetland management plans.

G – Or to design coherent sampling plans with the available resources.

I – In this unit, we will talk about direct monitoring methods. These methods depend on many factors such as: (i) the monitored species, (ii) the size of the site, (iii) coastal accessibility, (iv) observation points giving an overall view, (v) the time available to carry out the count, (vi) the number of people to include, (vii) the equipment available.

G – In all cases, monitoring requires experienced staff and meticulously preparation.

I – If possible, apply the same monitoring protocol during each site visit. It can however be difficult to standardise counting protocols on sites undergoing important changes over time.

G – Indeed, frost, drought or floods can greatly influence the counting conditions from a year to the next, and these factors should be considered when drawing up protocols and data analyses.

I – Waterbirds can be monitored directly in three different ways:

* Ground counts, usually done on foot, sometimes by bicycle or by car.
* Monitoring from a boat
* Aerial monitoring from a plane or a helicopter…

Ground counts are the easiest and most commonly used protocol.

G – You can also take photographs or films and use these to individually count birds, or simply verify the observers’ estimates.

I – During each visit, the site should systematically be covered on foot following an identical pre-determined route, following the transect model. Use binoculars to identify the birds.

G – Identify the species, count individuals of each species, determine the gender ratio for some of them, observe inter-specific combinations, note feeding behaviours etc.

I – As there can be many individuals at the same place, bird counts are often done per block. Experienced observers can count blocks of 10, 20, 50, 100 birds of more. Birds of the first block are generally counted one by one, then, the mental image of this first block is carried forward to the entire group to estimate the total number.

G – Most observers use blocks of 10 birds – it can be complicated to go above that number. A tally counter recording the number of birds or blocks can improve precision and avoid forgetting an individual or a block. Of course, you can use a voice recorder or ask help from a colleague.

I – Blocks of 100 birds or more are generally only applied to birds flying, when the time at hand to count is very limited. In this case, it is usually easier to proceed from the back of the fleet, by examining the group in its flying direction using binoculars or a telescope.

G – Of course, on small sites, it is better to count birds one by one. It is usually easier to count birds that are resting or feeding themselves, standing on the ground or on the water.

I – If you wish to monitor a colony of breeding birds, it is crucial to minimise risks of disturbing them, and the observers should avoid getting to close, be that on foot, by car, boat or plane.

G – Just like it is for all types of monitoring aiming at detecting temporal variations, the same sites should be counted, season after season following the same standardised protocol.

I – The different methods can go from a rough estimate of the total number of breeding birds present, to a total count of occupied nests. If the colony is counted only once during breeding season, all the occupied nests occupied by eggs or chicks should be counted. If the count takes place monthly, only nests occupied by eggs should be counted.

G – As for larger colonies, proceed once more to estimates by counting in blocks. For birds breeding on large surfaces, the total number of birds can be estimated through quadrat sampling and extrapolations.

I – In the end, good monitoring is above all based on the observers’ quality and precision, but of course, this is true for all types of monitoring.