Review of wetland inventory information in Eastern Europe

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1 Introduction

The Eastern European countries covered by this review are listed below in table 1.1. These countries constitute the Ramsar Region of Eastern Europe, which encompasses some twenty-two countries. This includes the Baltic Sea countries of Estonia, Latvia, Lithuania and Poland in the north. It also includes the land locked countries of the Czech Republic, Belarus, the Slovak Republic, Hungary and Armenia, and the Black Sea countries of Ukraine, Moldova, Romania, Georgia, the Russia Federation (extending across central and Eastern Asia) and Bulgaria, and the Caspian Sea country of the Republic of Azerbaijan. It encompasses the countries of Albania, Slovenia, Croatia, Bosnia and Herzegovina and the former Yugoslav Republic of Macedonia and Serbia and Montenegro in the south.

Table 1.1 Countries included in the Ramsar region of Eastern Europe

Countries included in Eastern Europe	
Albania	Latvia
Armenia	Lithuania
Azerbaijan, Republic of	Macedonia, the former Yugoslav Republic of
Belarus	Moldova
Bosnia and Herzegovina	Poland
Bulgaria	Romania
Croatia	Russian Federation
Czech Republic	Serbia and Montenegro
Estonia	Slovak Republic
Georgia	Slovenia
Hungary	Ukraine

This review was based on national datasets (including the possibility that a composite national dataset could be amalgamated by equivalent, eg provincial, data subsets). From the beginning, the assumption was made that significant (national) information on wetland extent, health, attributes and values might be found in many other information sources besides conventional wetland inventories or directories. It is believed that this constitutes a divergence from previous studies. While this broadened the scope and potential of the material examined, it also meant that all studies were effectively judged as if they were undertaken with wetland inventory objectives in mind. Often, of course, this was not the case.

Furthermore the authors acknowledge the following deficiencies in this study. The dataset is incomplete – for some countries this is more of a concern than for others. The compressed time frame and limited resourcing for a project of this nature probably promoted certain biases (for example, over-reliance on English language studies and on the more-familiar elements of contact networks) and was likely heavily influenced by the lag time between requests for study material, and its ultimate receipt. Finally, due to time and resource constraints, spatial information datasets have not been adequately reviewed; this constitutes a large gap in this preliminary study.

Boundaries are not authoritative

Figure 1.1 Map of the Eastern Europe region

2 Information sources

2.1 Search strategy

This review can simply be described as an inventory of wetland inventories based on national datasets (including composite national datasets that were amalgamated from equivalent, eg 'provincial', data subsets).

Potential sources of wetland inventory data were identified through communications with an extensive network of contacts (Annex 1), and using the World Wide Web, external (eg Wageningen Agriculture University databases) and in-house libraries, Ramsar National Reports, and IWRB National Reports. Key words used in literature searches included combinations of the more obvious terms such as:

> *wetland, wetlands, inventory, extent, status, distribution, classification, directory, overview, review*

and habitat names including the following:

> *grasslands, peat, peatland, bog, marshes, swamp, lakes, water, reservoirs, pond*

and less obvious terms such as:

> *survey, area, intertidal, subtidal, riparian, aquatic, coastal, evaluation, mapping, census, state, waterfowl, waterbirds*

also non-English search terms including:

> *Les zones humid, Le zone umide, zones humides d'importance, Flussordnungszahlen, Le Littoral, los Humedales, resources cotieres*

Where the above terms did not prove successful for any individual country, a search by country name was conducted followed by a lengthy examination of the resulting 'hits'.

In addition, the reference lists of material obtained were scanned for possible wetland inventory sources. In many cases this proved to be a more successful approach for identifying potential information sources than database or web searching, particularly for unpublished sources.

2.2 Evaluation of the Eastern Europe dataset

The methodology used to identify and evaluate material for the Eastern European dataset follows.

2.2.1 Evaluation of inventory material for inclusion in the EEUR dataset

Many potential sources were obtained, and their suitability for inclusion in the database was assessed. The decision whether to include or exclude certain sources depended on several factors. Poor quality material was not usually included except where no alternative data for a country could be obtained. Sub-national data were excluded except where no national information existed. In cases where material was encountered which contained no area data, but did contain other useful information, it was considered if no other information for that country was identified.

2.2.2 Meta-data recording

Each assessed information source was evaluated using a *Wetland Inventory Assessment Sheet* (WIAS) designed to permit rapid assessment and compilation of information about each identified inventory and to compile summary information about the wetland resource contained in each inventory. A set of guidelines for the completion of the sheet was also developed to facilitate consistent handling and coding of relevant information. Derivation of wetland coverage estimates and other wetland parameters are discussed in later sections.

A database was created to include information about each information source that was reviewed and recorded on a WIAS datasheet. Another database was also created to serve as a data dictionary of the codes (and their descriptions) which was used to represent various categories of information in the primary database.

Computer programs were written to analyse the majority of coded fields in the database. The analyses report on the presence or absence of codes or logical values (by use of a filtering system), and produced printed outputs. These outputs provide the meta-data breakdowns given in this report.

2.3 Materials sourced

Some 28 wetland inventory sources were included in the Eastern European (EEUR) dataset. The number of inventories examined per country is given in table 2.1 and graphically represented in figure 2.1.

The materials examined included both published (including World Wide Web articles, journal articles and books) and unpublished material, academic material (including peer reviewed material, MSc and PhD theses) governmental and non-governmental material, draft reports, newsletter articles, conference proceedings and consultancy reports.

Table 2.1 Numbers of material sourced per country in the Eastern European Ramsar region

Eastern Europe	No. of materials sourced
Albania	5
Armenia	1
Azerbaijan, Republic of	1
Belarus	2
Bosnia & Herzegovina	1
Bulgaria	4
Croatia	4
Czech Republic	3
Estonia	6
Georgia	3
Hungary	4
Latvia	6
Macedonia	5
Moldova	2
Poland	4
Romania	4
Russian Federation	7
Serbia & Montenegro	2
Slovak Republic	3
Slovenia	2
Ukraine	4

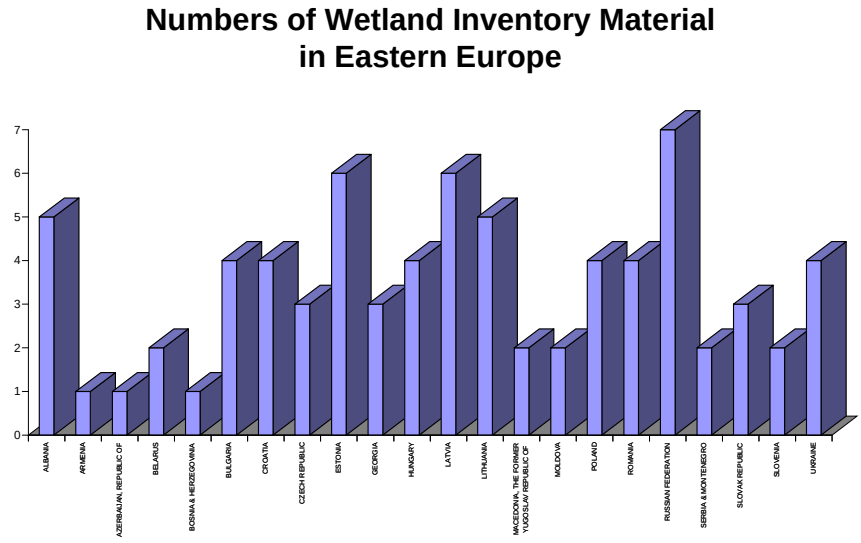

Figure 2.1 Numbers of wetland inventory material in Eastern European countries

As such, conventional wetland inventories and directories were examined, also natural resource inventories or habitat surveys (which either directly or indirectly included wetlands), and also sources which contained wetland extent information merely as a by-product of some other activity (eg waterfowl counts).

Since a degree of selection occurred in choice of material included in the Eastern Europe (EEUR) dataset, it cannot be stated that 'x' countries have more wetland inventory material than 'y' countries. In some cases, several sources of material were required in order to make a best estimate of wetland coverage for a specific country, whereas, for other countries, one source alone was comprehensive and detailed enough to provide a best estimate of wetland coverage.

2.3 Summary of information sources reviewed

The majority of materials examined (78%) were national level material and some 15% were supra-regional (ie covering more than one Ramsar region, though not covering every country in the regions).

Scale of inventory of material	
Global scale	4%
Supra-regional scale	15%
Regional scale	0%
Sub-regional scale	7%
National scale	78%
Single country studies	74%
National scale references including more than one country	4%
Sub-national scale	0%
National and other scale combination	4%

Non-governmental publications comprised 49% of material examined in the region (comprised of some 30% non-governmental organisation (NGO) produced reports and some 19% formal publications). Governmental organisation (GO) produced material comprising some 15% of material examined (comprised of some 45 internal government reports, 7% governmental formal publications and 4% other governmental material). This was similar to the material examined for Africa but differed greatly from Western Europe (Stevenson & Frazier 1999a,b) where most wetland inventory material was generated from governmental sources. Some 19% of material were published on the World Wide Web, and for these it was often not possible to identify whether this resulted from governmental or non-government efforts.

Type of source material	
Peer review journals	4%
Peer review books	4%
Chapters in books	4%
Conference or keynote presentation	0%
Article in conference proceedings	0%
Internal government reports	4%
Government formal publications	7%
Other government material	4%

NGO reports	30%
NGO formal publications	19%
Consultancy reports	0%
Newsletter articles	0%
Practitioner periodical article	0%
Database manual	0%
Electronic database	4%
World Wide Web article	19%
Thesis	0%
Other	4%
Unknown	7%

Some 63% of sources examined were either conventional inventories or directories, or their equivalent, a higher percentage than found in either Africa or Western Europe (Stevenson & Frazier 1999a,b).

Source is a directory/inventory or equivalent?	
Yes	63%
No	37%

The majority of studies were in English (78%), with the remaining sources in a variety of languages including Czech, Russian, Estonian and Latvian.

Language of study	
English	78%
Other	22%

Nearly all the materials were in paper format (78%), although 19% of the material was available on the World Wide Web, and some 7% were in electronic database format. Interestingly Eastern Europe had more wetland inventory information on the World Wide Web than material examined for the Western Europe, the Middle East and Africa region (Stevenson & Frazier 1999a,b), although in many cases the information was slim, often amounting to only a paragraph or less, and often part of the well publicised 'State of the Environment' reports. One notable exception to this was the Georgia State of the Environment World Wide Web report that contained excellent coverage of the Kolkhetti Lowland Wetlands (*Wetlands of Kolkhetti Lowland* 1997). It was noted however, that this information appeared to be directly taken from a report by Lansdown (1996).

Format of study	
Paper	78%
Electronic text	4%
Electronic database	7%
Personal communication	0%
Web presentation	19%

Part of GIS or GIS output	0%
Map based	0%
Other format	19%
More than one format	7%

Similarly, most information (70%) was stored in paper format, though 19% of information was stored within electronic databases, and 19% on the World Wide Web. A very small percentage was stored as digitised maps or hard copy maps (each at 4%), and for 4% the storage medium was unknown. Several were stored in more than one medium (15%) though this figure is probably an underestimate, since details of storage were often not stated in, for example, World Wide Web documents, which may also be stored on paper or as word-processed documents.

Data storage media	
Paper	70%
Web (electronic)	19%
Other electronic (not web or dbase)	7%
Electronic database	19%
GIS	0%
Hard copy map	4%
Digitised map	0%
Other	4%
Unknown or ambiguous	4%
More than one medium	15%

The majority (56%) of material examined had been published (in one way or another), which is slightly higher than the figure for Africa (only 43% published) (Stevenson & Frazier 1999a), but much lower than Western Europe (78% of material was published) (Stevenson & Frazier 1999b). (It is assumed that publications have greater circulation or dissemination potential than unpublished material.) The fact that non-governmental organisations are responsible for conducting wetland inventory activities in Eastern Europe rather than governmental organisations, may be the reason why only approximately half the wetland inventory material in this region is formally published.

Circulation of study	
Published	56%
Interdepartmental (unpublished)	0%
Internal (unpublished)	11%
Restricted (unpublished)	0%
Unrestricted (unpublished)	26%
Other types	7%
Unknown	4%
More than one type	4%

In Western Europe where GOs produce most of the wetland inventory material (Stevenson & Frazier 1999b), a higher proportion of the material is also published. A substantial amount of NGO inventory material throughout the Africa, Europe, Middle East region often comprised draft reports or unpublished final reports, which had not been published (presumably due to lack of funding). This seemed to be particularly prevalent in Eastern Europe, with many reports remaining unpublished covering wetlands in Belarus, Ukraine, Georgia, Moldova, Russia, Latvia and Lithuania.

2.5 Reliability of data

It is difficult to make judgements on the reliability of the individual data sources examined and included in this review when much of the material did not provide basic information. For instance, basic information such as the date of survey or date ranges of material featuring in a compilation/review, methodologies used, or contact information was frequently omitted. The tendency is to judge material as unreliable if it does not contain such basic information, but this judgement is by no means certain. The variety of classification schemes and definitions of wetlands used (often not defined) further hampers any attempts to judge the reliability of material. However, as material for individual countries is judged collectively, it becomes (subjectively) more clear which information sources are likely to be more reliable.

By examining the methods, the date ranges and inclusion (or exclusion) of particular wetland types it is possible to at least generate best estimates of wetland coverage for any particular country by consolidating the estimates from several sources. For example, one source may provide an estimate of wetlands in a country comprising an estimate of coastal wetlands which appears to be accurate, but an estimate of freshwater wetlands which noticeably excludes (for example) floodplains. The estimate for coastal wetlands would then be consolidated with the estimate of freshwater wetlands provided by another source examined that purports to include floodplain wetlands (providing it was a greater area than the other source).

Section 3.3 provides a more detailed description of how wetland area estimates by type were generated for this review, and provides guidance for interpreting the summary sheets of wetland coverage and extent (Annex 2) and material reviewed. Comments on the age of data, methods used and exclusions in coverage (eg the estimate excludes floodplain wetlands and ephemeral wetlands) are given and these provide an assessment of data reliability.

Several generic difficulties emerged throughout the evaluation process that should be noted when judging the reliability of data. These are summarised below.

- usage of different wetland definitions/classifications and the inclusion or exclusion of some wetland types, eg lakes and open water, in inventories. Certain wetland types are frequently excluded from wetland assessments (see section 3.1 for further details).
- artificial wetlands were also often largely ignored in many national inventories and therefore national inventories are often incomplete in their coverage.
- the date of data collection and inventory productions were often not recorded, and it should be noted that review compilations by their very nature, use different sources of widely differing ages (the dates of which are rarely stated).
- recent changes in political boundaries (a particular issue in Eastern Europe and the former USSR) made older sources difficult to interpret.
- defined boundaries of wetlands were often not provided, making comparisons between different sources difficult, as did the variable treatment of individual wetlands in wetland complexes.

- many sources lacked a summary, making extracting national-level information time-consuming; some of the material (which did provide a summary) contained summary information that did not always match the text of the report.
- the wide variety of languages of national inventories made extraction and review of information difficult and time consuming (and potentially expensive if translations were carried out).
- many potential wetland inventory information sources were unpublished material which proved to be difficult to obtain or access; much of the information that was accessed were also draft reports written up to 5 years ago which have never progressed beyond draft report stage.
- often the areas provided in many potential sources of information were site areas, eg national park areas and not actually wetland areas (these sources were excluded from the analysis, with the exception of Ramsar sites).
- contradiction of information about some sites *between* different references was found to occur. With a little detective work, in most cases it was possible to identify erroneous material, but this was not always possible.
- contradictions within *one individual* source document were also noted to occur. This meant that some detective work was often required to identify and rectify errors, resulting in slow assessment.

This project has identified several cases where source material has quoted wetland area estimates taken from studies that had been comprehensively updated by more recent studies, and therefore their estimates were out of date, and had been supplanted by more recent and accurate data. This creates a misinformation trail that makes it difficult to assess the accuracy of reports that yield conflicting data.

Some less accessible inventories have been missed in this review. Additional material has been identified since the analysis phase was completed and some key sources of material were therefore not incorporated in this preliminary analysis. Further additional sources may be revealed during the consultation phase and after circulation of the completed report. An update of the dataset is recommended after the consultation process has been completed.

3 Extent and distribution of wetlands

3.1 Definition and classification of wetlands

A major consequence of using the rather broad Ramsar definition of wetlands in this review (given in Annex 3 Definitions and Abbreviations) is that the estimates of wetland coverage generated by this project cannot strictly be regarded as estimates of true or actual wetland cover, but are instead estimates of *described* wetland cover. Consequently, the area values given in this review should be viewed as underestimates, and do not represent estimates of the entire wetlands resource, but only those for which coverage estimates already exist in their many disparate forms.

Differing wetland definitions and classification schemes were used in different studies and these definitions are not always stated, making it difficult to assess the degree of completeness of cover (and thereby the estimates of wetland extent). For instance, many inventories include or exclude some wetland types, eg open water bodies, and estuaries.

A definition of the terms ‘marine wetlands’, ‘coastal wetlands’ and ‘inland wetlands’, was almost without exception absent, and yet separate authors used them to mean different things.

Extracting information on even broad wetland categories was found to be difficult. Particularly when some authors use, for example, the term ‘coastal wetlands’ to mean strictly saline and brackish habitats and others use it to mean wetlands in the coastal zone (which often for practical purposes means coastal lowlands and incorporates wetlands which experience no tidal inundation). For instance, Lansdown (1996) provides a value of 39 844 ha of ‘coastal wetlands’ in Moldova, and yet Moldova does not have a coastline, although it is in close proximity to the Black Sea. Similarly the term ‘inland wetlands’ to some authors meant freshwater wetlands, to others it meant all wetlands except those in the coastal plain, to others it meant all wetlands except those wetlands under tidal influence.

It was apparent (though not defined) that many authors utilised a more narrow definition of wetlands than that given by the Ramsar definition. For instance, many authors may argue that wetlands must be vegetated (therefore mudflats and sand flats and open water would be excluded). Others may argue that coral reefs, seagrass beds and subterranean karst are not wetlands, and others may also exclude artificial or created wetlands from their definition of wetlands. Similarly, forested wetlands are often regarded as forests and not wetlands, and are therefore excluded from wetland assessments (and yet may also be excluded from forestry assessments for exactly the opposite reason).

It is therefore not surprising that certain wetland types were commonly excluded from wetland assessments. These include dune slacks, humid sands, wet mesotrophic grasslands, seagrass beds, maerl beds, glacial and alpine wetlands, artificial wetlands (especially reservoirs, fish ponds, rice paddies, dams etc) and, finally, recent additions to the Ramsar list of wetland types, such subterranean karst wetlands.

Wetland definition	
Definition provided	26%
Definition implied	44%
No definition provided or implied	30%
Unknown/ambiguous	0%
Ramsar definition	
Ramsar definition used	59%
Ramsar definition not used	15%
Use of Ramsar definition unknown	26%
Ramsar classification	
Ramsar wetland types used	56%
Other wetland classification used	4%
Wetland classification varies	0%
Unknown	22%
Not applicable	19%

In the Eastern European region several terms were commonly treated differently. These included different treatment of the terms ‘coastal’, ‘marine’ and ‘inland’, and ‘peat’, ‘bog’, ‘mire’ and ‘fen’. Estuaries, open water bodies, tidal flats, riparian systems, artificial waterbodies (eg reservoirs, flooded quarries etc) appeared to be excluded form many wetland inventories.

A definition of wetlands was provided in only 26% of studies; in 44% of cases a definition was implied, but in 30% of cases no definition was either provided or could be surmised. However, 59% of studies used the Ramsar definition of wetlands (though it was unknown for

26% of studies, so the true usage of the Ramsar definition of wetlands may be much higher). The Ramsar classification system for wetland type was used in 56% of studies (compare this with 7% in Western Europe, Stevenson & Frazier 1999b), was unknown for 30% of studies and not applicable for some 19% of studies (these were usually reviews or collations of material).

3.2 Overall extent of wetlands in Eastern Europe

In 89% of studies, only part of the wetland resource was examined, whereas all wetland resources were purportedly included in just 11% of studies. Where only part of the wetland resource was assessed by a study, the basis for selection was mainly influenced by landform type (ie inland, coastal, lowland, upland) and jurisdiction (ie over a province or sub-national region). This is interesting in that this differs from Western Europe where habitat type (eg forested peat, coastal marsh) was the most common basis for selection of wetlands for study. Some 44% were due to 'other basis' and these included wetlands of international importance, and 'shadow' Ramsar sites).

Extent of coverage	
All wetlands	11%
Part of wetland resource	89%
Ambiguous	0%
Wetland type coverage	
Sources providing area values per wetland type	52%
Sources partially providing area values per wetland type	44%
Sources not providing area values per wetland type	0%
Not known	4%

The fact that 89% of studies examined only part of the wetland resource should be noted when viewing the estimates of wetland coverage in each country in the region, since they are only estimates, rather than verified values.

Basis of selection (if not complete wetland coverage)	
Geography/jurisdiction	30%
Land cover or remotely sensed data	0%
Landform type	19%
Suprahabitat	0%
Habitat type	11%
Floral/faunal groups or species	0%
Climate	4%
Wetland function	0%
Hydrology	0%
Biodiversity value	15%
Cultural value	0%
Artefact of data collection	19%
Other basis	44%
Unknown or ambiguous	0%

More than one basis	48%

A summary of wetland coverage in Eastern Europe is presented in tables 3.1 and 3.2 below. The total area calculated by the EEUR dataset amounted to some 229 217 000 ha, covering 12% of the land surface. As would be expected, more than 96% (220 149 331 ha) of these were inland wetlands, with less than 2% described as marine/coastal wetlands (4 051 818 ha) and a further 0.15% described as artificial wetlands (355 700 ha).

It should be noted that if the data for Russia is removed from the EEUR dataset, a mere 0.6% of the land area is by covered by wetlands (11 580 000 ha). This is an extremely low percentage by comparison with that identified by the datasets for Western Europe and Africa (Stevenson & Frazier 1999a,b). It is also very low when you consider that according to Matthews and Fung (1987) more wetlands are located in temperate than in sub-tropical or tropical regions, and when you consider that Eastern Europe is much less populated than Western Europe. These statements by Matthews and Fung (1987) would suggest that the estimates of wetland coverage resulting from the EEUR dataset are a gross underestimate.

Since the scope and coverage of most inventory material did not state whether total wetland estimates included Ramsar sites, it is not possible to state whether this value includes, partially includes or excludes these sites. It must also be noted that the area values for Ramsar sites given in table 3.2 are site area and not wetland area.

Table 3.1 Wetland coverage in Eastern Europe as identified by the EEUR dataset

Eastern Europe	Estimate of area in hectares (ha)
Marine/coastal wetlands	4 051 818
Inland wetlands	220 149 331
Artificial wetlands	355 700
Area of unspecified types of wetland	4 660 123
Total area of wetlands identified in this study	229 216 972
# of national datasets per region	36
# of national datasets which can be regarded as comprehensive in cover	3

Table 3.2 Wetland coverage in Eastern Europe as a percentage of land cover, and Ramsar site information

Eastern Europe	
# of countries	22
Total land area of Region (ha)	1 944 683 100
Total area of wetlands identified in this study (ha)	229 216 972
Median value of wetland area (ha)	–
% of land area covered by these wetlands	11.79%
Total area of Ramsar sites (ha)	12 646 392
# of Ramsar Sites	128

(Source of Ramsar site Information: Ramsar Database, date of data extraction 17/8/98)

3.3 Wetland extent in Eastern European countries

Best estimates of wetland extent by broad wetland type ('inland', 'marine/coastal' and 'artificial') for the Eastern European countries are given in table 3.4. A description of how best estimates of wetland coverage per country were derived is outlined below.

3.3.1 Derivation of country 'best estimates' of wetland coverage

The estimates of wetland coverage cited in the material examined in this review (and included in the Eastern European dataset) were entered into a system of *country coverage files* (in spreadsheet format). An individual wetland coverage file for each country within the Eastern European region, was created to facilitate the generation of best estimates of wetland area coverage per country and to serve as a summary and provide an 'audit trial' of material included.

Each file (workbook) consisted of several components (worksheets) broken down by Ramsar wetland type and also by broad wetland category (marine/coastal, inland and artificial) as follows:

1. Sheet one contains area statistics for marine/coastal wetlands broken down by Ramsar wetland type (*types: A, B, C,D, E, F, G, H, I, J, K*).
2. Sheet two contains area statistics for inland wetlands broken down by Ramsar wetland types (*types: L, M, N, O, P,Q, R, Sp, Ss, Tp, Ts, U, Va, Vt, W, Xf, Xp, Y, Zg, Zk*).
3. Sheet three contains area statistics for artificial wetlands broken down by Ramsar wetland types (*types: 1, 2, 3, 4, 5, 6, 7, 8, 9*).
4. Sheet four contains 'notes and comments' which provides an indication of the reliability of the data (subjective assessment), and notes about methodology and or original sources of data.
5. Sheet five 'summary' contains the *total* values for 'marine/coastal', 'inland' and 'artificial' wetlands (not broken down per Ramsar wetland type) and the 'notes and comments' sheet. This sheet is generated automatically from sheets 1–4. Changes made to sheets 1–4 will update in the summary sheet.

The summary sheet (sheet five) for each country can be found in Annex 2. Where possible, approximate estimates per Ramsar wetland type were entered in the appropriate columns (in sheets 1–3; where this was not feasible, approximate values for broad wetland type were entered, and where this was not feasible, a total value was entered. This created a hierarchical system where it was possible to examine the quality of wetland coverage and extent information per country, which was assessed in the Eastern European dataset.

Each file provided wetland estimates, along with brief notes as to scope, and in particular, exclusions in coverage (eg open water bodies), and gave an indication as to the reliability of the data (sheet 4). This provided a convenient means of auditing all the material included in the dataset, and provides an 'at a glance' summary of the material examined.

Once all the wetland area values had been entered into a coverage file for each country, along with the appropriate notes on method and reliability, a subjective assessment of all material for each country was made. Best estimates were composed according to broad wetland category (marine/coastal, inland and artificial), and a justification of the rationale entered into sheet 5. Once the coverage files were completed for all the countries within a region, the estimates were compiled into a summary table (given in table 3.4).

It should be noted that several wetland inventories included information on more than one country, and hence these documents feature in many country coverage files. The number of materials (referred to as datasets) examined per country were totalled and also entered into the summary document for each region.

Please note: there are some notes which will appear on summary sheet five which refer to specific Ramsar wetlands or values shown on sheets 1–4 (in the individual country coverage files as described above). In a small number of cases the notes appearing on the summary sheet are not self-explanatory when viewed independently of sheets 1–4. This is regrettable, but unavoidable given the time constraints associated with the production of national overviews.

The summaries of wetland coverage for each Eastern European country deemed to have sufficient material to generate a 'best estimate' of wetland coverage either in total or by category type (inland, marine/coastal, artificial) can be found in Annex 2. Notes on the reliability of the assessment are included with each summary. Countries that were omitted from the 'best estimate' and reliability assessment due to lack of data in the WEUR dataset are given below in table 3.3.

Table 3.3 Countries omitted from the 'Best Estimate' and reliability assessment due to lack of data in the Eastern European (EEUR) dataset

Eastern Europe	
Armenia	Macedonia
Azerbaijan (Republic of)	Serbia and Montenegro
Belarus	Slovak Republic
Bosnia and Herzegovina	Slovenia

3.3.2 'Best estimates' of wetland coverage per country

'Best estimates' of Wetland Coverage per Broad Wetland Category for Countries in the Eastern Europe Region are given in table 3.4.

4 Rate and extent of wetland loss and degradation

The majority of sources examined (81%) did not provide any details of wetland loss and/or degradation. This does not mean that loss values do not exist, simply that the material sought for this review was wetland inventory material, which as it turned out, rarely dealt with these issues in any detail. No specific tasks were performed to identify material that specifically outlined wetland loss (in isolation of inventories/directories). Thus, wetland inventory material within the Eastern European region does not normally include any appreciable data on wetland loss. This may, however, be directly related to the time scale of most wetland inventory activities, which are largely discrete surveys, which have not yet been repeated.

Wetland loss and degradation	
Sources providing information on wetland loss and/or degradation	15%
Sources not providing information on wetland loss and/or degradation	81%
Not known	4%

Table 3.4 Best estimates of wetland coverage per broad wetland category for countries in the Eastern Europe Ramsar region[1]

	BEST ESTIMATES					COVERAGE INFO		RAMSAR INFO	
EASTERN EUROPE REGION	**Marine/Coastal (ha)**	**Inland (ha)**	**Artificial (ha)**	**Unspecified wetland type (ha)**	**Total (ha)**	# of datasets accessed per country [1, 2]	# of datasets which can be regarded as comprehensive in cover per country	Total area of Ramsar sites	# of Ramsar sites
ALBANIA	20 000	35 000	unknown		**55 000**	2	1?	20 000	1
ARMENIA	none	no data	no data		**no data**	0	0	492 239	2
AZERBAIJAN, REPUBLIC OF[3]	insufficient data	insufficient data	insufficient data		**insufficient data**	1	0	132 500	1
BELARUS	insufficient data	insufficient data	insufficient data		**insufficient data**	1	0	0	0
BOSNIA and HERZEGOVINIA	no data	insufficient data	no data		**insufficient data**	1	0	0	0
BULGARIA	unknown	10 000	220 000		**230 000**	2	0	2 803	5
CROATIA	unknown	unknown	unknown	116 423	**116 423**	2	1?	80 455	4
CZECH REPUBLIC	none	unknown	49 000		**49 000**	1	0	37 891	10
ESTONIA	unknown	unknown	unknown	4 543 700	**4 543 700**	5	0	215 950	10
GEORGIA	37 145	1 079	unknown		**38 224**	2	0	34 223	2
HUNGARY	none	50 000	26 000		**76 000**	2	0	149 841	19
LATVIA	142 600	640 165	3 500		**786 265**	3	1	43 300	3

1. Please consult 3.3.1 for a description of how these estimates were generated.
2. Excluding the Ramsar sites and GLCC databases.
3. Ramsar Site was designated by the former USSR; Azerbaijan has not yet acceded to the Convention on Wetlands.
4. The author Lansdown (1996) refers to these wetlands as 'coastal' and yet they are freshwater wetlands.

	BEST ESTIMATES					COVERAGE INFO		RAMSAR INFO	
EASTERN EUROPE REGION	**Marine/Coastal (ha)**	**Inland (ha)**	**Artificial (ha)**	**Unspecified wetland type (ha)**	**Total (ha)**	**# of datasets accessed per country[1, 2]**	**# of datasets which can be regarded as comprehensive in cover per country**	**Total area of Ramsar sites**	**# of Ramsar sites**
LITHUANIA	unknown	507 080	unknown		507 080	3	1	50 451	5
MACEDONIA	none	no data	no data		no data			18 920	1
MOLDOVA	39 844	unknown	unknown		39 844	2	1	0	0
POLAND	unknown	1 636 927	unknown		1 636 927	1	0	90 455	8
ROMANIA	unknown	269 080	unknown		269 080	1	0	647 000	1
RUSSIAN FEDERATION	578 599	217 000 000	57 200		217 635 799	5	0	10 323 767	35
SERBIA and MONTENEGRO	no data	no data	no data		no data			39 861	4
SLOVAK REPUBLIC	no data	no data	no data		no date			37 086	12
SLOVENIA	no data	no data	no data		no data			650	1
UKRAINE	3 233 630	unknown	unknown		3 233 630	2	0	229 000	4
Total estimated wetland cover	4 051 818	220 149 331	355 700	4 660 123	229 216 972	36	3	12 646 392	128

1. Please consult 3.3.1 for a description of how these estimates were generated.
2. Excluding the Ramsar sites and GLCC databases.
3. Ramsar Site was designated by the former USSR; Azerbaijan has not yet acceded to the Convention on Wetlands.
4. The author Lansdown (1996) refers to these wetlands as ‘coastal’ and yet they are freshwater wetlands.

Of the 15% of material in the Eastern European region which did provide some information, this was almost exclusively descriptive, rather than quantitative. Whilst wetland loss throughout Eastern Europe is thought to be substantial, very little quantification of loss or damage was uncovered in this review. It was therefore not possible to either refute or support other existing reported values. The following statement was published by OECD (1996):

> Some estimates show that the world may have lost 50% of the wetlands that existed since 1900; whilst much of this occurred in the northern countries during the first 50 years of the century, increasing pressure for conversion to alternative land use has been put on tropical and sub-tropical wetlands since the 1950s.

Jones and Hughes (1993) provided an overview of the extent of wetland loss in Europe. The only study allowing broad comparisons for a particular wetland type across the whole of Europe are that of Immirzi et al (1992), which reports loss rates for peatlands in excess of 50% for 11 European countries).

It was noted that a wide diversity of methodologies are used to measure wetland loss, and the lack of co-ordination between studies in different countries or for different wetland types prohibits any overview at regional level.

More recent information on wetland loss may have emerged since the works mentioned above. However, the important thing to note, is that, if the EEUR dataset is representative of the wetland inventory material that exists in Eastern Europe, we can conclude that wetland loss is rarely measured or recorded during wetland inventory activities in the region. Studies that specifically set out to measure wetland loss may have been undertaken, but loss values do not feature in inventory assessments.

Wetland status description	
Overall wetland status description included	44%
Overall wetland status description not included	48%
Unknown	7%

Similarly, of the material examined for Eastern Europe, only 44% included a description of overall wetland status in a country (though these descriptions were of course totally generic in nature). Overall, those that did provide such information often provided detailed individual site information (often the ‘study site’ subject to scientific research), and some studies provided an overview or summary of such information. These latter studies were generally not conventional wetland inventories or directories *per se*, and were frequently academic peer review publications, which are necessarily short in length. Where wetland loss information was provided it must be noted that the rates or amounts identified on a local scale do not necessarily reflect national trends in wetland loss. Overall, it can be said that the information on wetland loss was usually lacking, but where it was included it was highly variable and inconsistent in its detail.

Details of the major threats to wetlands are also lacking from most inventory material in the Eastern European region. Some site based studies do provide very brief descriptions of threats to individual wetlands; usually these studies are ones undertaken to designate or describe wetlands of ‘international importance’ (according to the Convention on Wetlands, Ramsar, 1971). Standard site descriptions are recorded on a Convention-approved form, the ‘Ramsar Information Sheet’ (RIS), and this *pro-forma* includes an information category called ‘Adverse factors’. This subject is recorded in the Ramsar Database according to an ad hoc set

of past (but still influential), present and/or potential wetland threats (both in and around the site). These developed based on the data that have been provided, rather than fitting incoming data to a pre-existing structured classification.

Due to this historical legacy, the urgency, extent and character of any threat at any site listed has never been codified in the current (to be supplanted) database. Such information, if it exists, might be found in individual site files that support the database. Oftentimes, the level of detail provided is very low, and example statements include 'peat cutting is common at the site' 'livestock grazing is causing physical damage to the wetland', 'water extraction for agricultural purposes is leading to a lowering of the water table'.

5 Wetland benefits and values

Wetland values as defined by the Ramsar Bureau, are 'the perceived benefits to society, either direct or indirect, that result from wetland functions. These values include human welfare, environmental quality, and wildlife support' (Ramsar Convention Bureau 1996).

A large proportion of material examined for the review was not a conventional inventory/directory (see section 2.4) and did not contain site by site information. These sources did not usually contain details of wetland values and /or benefits (other than generic statements), since they usually referred to wetlands at a national level (or at least above a local or provincial level) and would therefore not contain detailed management information.

Eastern Europe	Inclusion of wetland values and benefits information (site based studies only)
Some level of information	0%
Always	15%
Most of the time	11%
Commonly	7%
Sometimes	0%
Rarely	4%
Never	44%
Unknown	19%

Site based studies (usually wetland inventories *per se*) were treated differently in the evaluation process and were evaluated against Ramsar Information Sheet (RIS) categories, and the frequency (ie never, rarely, sometimes, commonly etc) of the inclusion of the RIS category was recorded. The frequency of inclusion of values and benefits information for *each and every site* described within (site based) studies was assessed. The results showed that 44% 'never' contained any values and benefits information; 'rarely' 4%; 'sometimes' 0%; 'commonly' only 7%; 'most of the time' 11%; and 'always' 15%. In the majority of non-site based studies, a paragraph or two describing values and benefits of wetlands in general was usually all that was provided. None of the material examined included any financial or economic estimates.

In the majority of site based studies (wetland inventories *per se*), values and benefits information amounted to one or two sentences per site. For example 'the site experiences pressure from artisanal fisheries', 'the wetland provides flood buffer and water storage capabilities', and 'the area is a tourist destination and the wetland provides healing muds

which are used in the many health spas'. In the majority of non-site based studies, a paragraph or two describing values and benefits of wetlands in general was usually all that was provided. None of the material examined included any financial or economic estimates.

6 Land tenure and management structures

A large proportion of material examined for the review was not a conventional inventory /directory (see section 2.4) and did not contain site by site information. These sources did not contain information on land tenure, management authority or jurisdiction, since they usually referred to wetlands at a national level (or at least above a local or provincial level) and would therefore not contain detailed management information.

When material did contain site by site information the material was evaluated against Ramsar Information Sheet (RIS) categories and the frequency (ie never, rarely, sometimes, commonly etc) of the inclusion of the RIS category was recorded. As can be seen below, for some 33% details of land tenure/ownership were 'always included'; for only 7% of the time, details of land tenure/ownership were recorded 'most of the time' and for some 37% of the time details were never recorded.

Some 41% of the material 'never included' jurisdiction information recorded, and only 22% 'always' contained jurisdiction information. Some 41% of the material also 'never included' any management authority information, but some 22% 'always' contained management authority information. In the cases where some information was included, this usually only extended to a sentence such as 'the site falls within the national park' or 'the wildlife department monitor the population of endangered species'.

Eastern Europe	**Inclusion of land tenure/ownership information (site based studies only)**
Some unknown level	0%
Always included	33%
Most of the time included	7%
Commonly included	0%
Sometimes included	0%
Rarely included	4%
Never included	37%
Unknown	19%

Eastern Europe	**Inclusion of jurisdiction information (site based studies only)**
Some unknown level	4%
Always included	22%
Most of the time included	7%
Commonly included	4%
Sometimes included	0%
Rarely included	4%
Never included	41%
Unknown	19%

NB The Ramsar information sheet states 'Jurisdiction (territorial eg state/region and functional eg Department Agriculture/Department of Environment)'

On the whole it can be said almost no sources in the Eastern European region contained information on land tenure, management authority or jurisdiction.

Eastern Europe	Inclusion of management authority information (site based studies only)
Some unknown level	7%
Always included	22%
Most of the time included	7%
Commonly included	4%
Sometimes included	0%
Rarely included	0%
Never included	41%
Unknown	19%

NB The Ramsar information sheet states 'Management authority: (name and address of local body directly responsible for managing the wetland)'

7 Extent and adequacy of updating programs

The majority (50%) of information examined in this review were published or dated after 1995, and some 35% were published or dated between 1991 and 1995. Most of the information was judged to not have a temporal scale (generally these studies were reviews and collations), and only 7% had defined temporal scale (ie were discrete 'one-off' surveys, or ongoing surveys) with a further 11% unknown.

Publication Date	
After 1995	50%
Between 1991–1995	35%
Between 1986–1990	4%
Between 1981–1985	0%
Unknown/ambiguous	15%
Temporal scale	
Studies with a temporal scale *	7%
Partly include a temporal scale	0%
No temporal scale (eg review)	78%
Unknown	11%
** Broken down further:*	
Discrete surveys	15%
Surveys updated on an ad-hoc basis	4%
Update purpose to add sites	4%
Update purpose to review status	0%
Update purpose to make corrections	4%
Other update purpose	0%
Unknown purpose	0%
Current /ongoing surveys	7%
Updated on ad-hoc basis	0%
Updated on annual basis	0%
Frequency of update unknown	7%

It could be argued that low resolution comprehensive national field surveys should be undertaken (whether remotely or as part of ground surveys) as a priority to at least identify wetland locations for more detailed study later. However, in terms of resource conservation, repetition of detailed surveys at sites thought to be at risk should also be a priority undertaking. One-off surveys for previously un-surveyed areas are critically important in terms of resource assessment, but few surveys examined in this review were found to be part of a long-term assessment or monitoring program.

None of the inventories identified in the region (with the exception of the Ramsar database) have been updated after any given time interval after the first inventory. Wetland inventories must be regularly reviewed and updated otherwise data are likely to be lost, become out of date and become of historical interest only.

It would be overly critical to state that the updating procedures of wetland inventory in Eastern Europe are grossly inadequate, since 50% of the studies examined were published after 1995. The wetland inventory process in Eastern Europe is still relatively young, and therefore it is not surprising that no wetland inventories were identified that have been updated since first completion.

8 Standardising of inventory approaches

This section outlines the broad types of wetland inventory that have been included in this review, followed by notes on some relevant findings from the analysis of the Eastern European material which have bearing on wetland inventory approaches. Standardisation of inventory approaches must be developed in accordance with the objectives of those organisations carrying out wetland inventory. The 'who', 'how' and 'why' must be examined before any attempts to standardise procedures are made. Finally, generic suggestions for standardisation of wetland inventory approaches are outlined.

8.1 Types of wetland inventory

As stated by Scott (1993) in his review of wetland inventories and their role in the assessment of wetland loss, there are three main types of inventory:

- comprehensive national wetland inventories
- regional or global inventories of specific wetland types
- national or international inventories of wetlands of special conservation importance

This review of wetland inventory material in Eastern Europe included material in each of these categories, which were defined by Scott (1993) as follows:

comprehensive national wetland inventories:

these constitute an accurate account of the location and extent of all wetland resources: they usually included detailed mapping and may or may not include an evaluation. Such inventories are time consuming and costly, and require a precise wetland classification system. However they provide an ideal basis for a comprehensive assessment of wetland loss over time.

regional or global inventories of specific wetland types:

such inventories are usually too crude and contain too many gaps in coverage to provide a baseline assessment of wetland loss.

national or international inventories of wetlands of special conservation importance:

these focus on specific sites or systems with high conservation values, rather than wetland types, and on the whole exclude wetland habitat that is too small, fragmented or degraded to merit special attention. The Ramsar Convention provides an agreed set of criteria for the identification of sites of international importance, and these have been, or are being used in the compilation of wetland inventories in most parts of the world. Inventories of this type can be carried out relatively quickly and cheaply, and are of considerable value in focusing conservation effort where it is most required. While far too superficial to be used to measure total wetland loss, they constitute a sound basis for the monitoring of rates of loss of key habitat, especially those in countries which are unable to conduct comprehensive wetland inventories in the foreseeable future.

To this list, a further group could be added

landscape level mapping of land use and land cover:

these focus on the landscape from an anthropogenic perspective, and provide information on land use and land cover. They usually utilise satellite remote sensing technologies in combination with topographic maps, and soil maps. The resolution is frequently low (100 x 100 ha) and does not distinguish between many wetland types (this can be due to limitations in the spectral capabilities of the sensor, or may be due to operator preference). Wetlands are usually lumped into very broad generic categories. These may be categories such as 'open water', 'forested wetlands', and 'agriculturally improved wetlands', or may simply be one very broad category 'wetlands'. In such inventories wetland habitat is quantified in terms of approximate area, and the distribution mapped. There is potential for monitoring total national wetland loss or change if the spatial resolution of the satellite sensor is high, or if rates of loss or change are very high. Assessments of wetland quality do not feature in these landscape maps.

8.2 Wetland inventory approaches in Eastern Europe – results from the analysis of the dataset

8.2.1 Who is conducting wetland inventory and who is funding it?

Non-governmental organisations (NGOs) were responsible for implementing 70% of studies in Eastern Europe and governmental organisations (GOs) were responsible for implementing a much smaller percentage (37%). Compare this with the figures in Western Europe where GOs implement a much greater proportion of wetland inventory activities.

Study implementation	
International NGO	44%
National NGO	26%
Sub-national NGO	0%
Local NGO	0%
International GO	11%
National GO	26%
Sub national GO	0%
Local GO	0%
Private agency/individual	4%
Consultancy agency	0%
Academic institution	7%
Other body	0%
More than one agency or body	22%
Unknown	7%

However, only 15% of studies were funded by NGOs and 66% by GOs (this 66% splits into 44% national GOs and 22% international GOs). In Eastern Europe at least, GOs appear to be funding more wetland inventory activities than NGOs, but appear to be implementing much less than NGOs. Perhaps this is linked to governmental capabilities, especially in newly independent states.

Study Funding	
International NGO	15%
National NGO	0%
Sub-national NGO	0%
Local NGO	0%
International GO	22%
National GO	44%
Sub-national GO	0%
Local GO	0%
Private agency/individual	0%
Consultancy agency	0%
Academic institution	0%
Other body	0%
More than one agency or body	4%
Unknown	22%

8.2.2 Why is wetland inventory being carried out?

One must ask why wetland inventories are being carried out? Considering the wide variety of organisations (NGOs, GOs, academics, consultants etc) undertaking wetland inventories in Eastern Europe, there is likely to be a variety of purposes. This study examined the objectives of wetland inventory activities. The objectives were explicitly stated in only 39% of studies (compare this to 59% in Western Europe – Stevenson & Frazier 1999b), and for more than half (52%) they were not explicitly stated. The most common objectives (including those explicitly stated and surmised) were for baseline inventory purposes (67%), international designation (48%), general biodiversity (41%), and public education (30%), Note that most studies had several objectives.

Statement of objectives	
Objectives explicitly stated	30%
Objectives not explicitly stated	52%
Unknown	19%
Main objectives of study	
General biodiversity	41%
Biodiversity research	4%
Baseline biodiversity	4%
Repeat survey/surveillance	0%
Management tool for biodiversity	0%
Biodiversity monitoring	0%
Wetland products	4%

Geographical	4%
International designation	48%
Baseline inventory	67%
Academic research	7%
Land use planning	15%
Wetland services	4%
Public education	30%
Other research	4%
Other	22%

Baseline studies are likely to include different information fields than studies carried out for international designation purposes. In Eastern Europe there are 128 Ramsar sites distributed through 19 countries (an average of 6.7 sites per country) (Contracting party and Ramsar sites information source: Ramsar Database, 17/8/98, Wetlands International, AEME). It is likely that the international designation of wetlands in Eastern Europe is in the early stages. The data fields required for baseline inventories, and the methods employed are likely to be very different to those required and utilised for international designation.

8.2.3 How are wetland inventory studies conducted?

Some 56% of studies examined for the Eastern European dataset were reviews and collations. Of the studies which were not reviews or collations, some 26% of studies undertook ground surveys, and some 4% utilised remote sensing techniques, which were largely dependant on aerial photography (none of those examined utilised satellite imagery). Of those studies that did conduct ground surveys, 4% of these were total or near comprehensive in their coverage, and 7% undertook ground surveys which were partial in their coverage.

Data collection methodology	
Collation or review	56%
Ground survey	26%
Remote sensing	4%
Questionnaire survey	0%
More than one methodology	15%
Unknown methodology	33%
Extent of ground survey	
Total	4%
Partial	7%
Unknown	15%
Type of remote sensing	
Satellite imagery	0%
Aerial photography	4%
Videography	0%
Radar imagery	0%
Lidar imagery	0%
Map product	0%
Unknown	0%

8.2.4 What definitions and classifications are used?

There are many definitions of wetlands, as others have noted (eg Davies & Claridge 1993). Dugan (1990) stated that over 50 separate wetland definitions were (even then) currently in use. Differing wetland definitions and classification schemes were used in different studies in Eastern Europe, and these definitions were not always stated, making it difficult to assess the degree of completeness of cover (and thereby the estimates of wetland extent).

For example, the term 'coastal wetlands' can mean strictly saline and brackish habitats, or to mean wetlands in the coastal zone (which often for practical purposes means coastal lowlands and incorporates wetlands which experience no tidal inundation). Sorensen (1997) provides six different and commonly used definitions for the term 'coastal area' which demonstrate the enormous difference between various meanings. Great improvements in the efficiency and accuracy of wetland evaluation could be achieved if common, but imprecise terms were more precisely defined.

A definition of wetlands was provided in only 26% of studies but it was implied in 44% of studies. Some 22% of studies appeared to use the Ramsar definition of wetlands (whether it was stated or implied) (though it was unknown for 26% of studies, so the true value may be much higher). The Ramsar classification system for wetland type was used in 56% of studies (compare this with 7% in Western Europe – Stevenson & Frazier 1999b); it was unknown for 22% of studies and not applicable for some 19% of studies (these were usually reviews or collations of material). This means that the Ramsar definition of wetlands and Ramsar classification has been commonly used in Eastern Europe, and has therefore provided some level of standardisation of approach. This of course is directly due to the fact that many Eastern European countries have recently become contracting parties to the Ramsar Convention, and are in the process of identifying and designating Ramsar sites.

See section 3.1 for further details.

8.3 Generic suggestions for the standardisation of inventory approaches

- Mechanisms to develop indices and scorecards of wetland value/benefits and site quality (status) should be developed to enable easy communication of information to be made to the decision-makers and the public.
- The presentation of data in wetland inventories should become more accessible by inclusion of summaries and the avoidance of poorly organised bulky text descriptions in favour of tabulated results.
- The scope of data coverage in wetland inventory activities should attempt to incorporate the information fields used in Ramsar Information sheets. This would aid management of trans-boundary wetlands and would facilitate regional and international wetland assessments which can be utilised in European (and global) policy and planning initiative.
- Every effort should be made to cover all wetland types, particularly those types that are currently under-represented in wetland inventories. This includes artificial wetlands, dune slacks, wet mesotrophic grasslands, seagrass beds, maerl beds, and glacial and alpine wetlands. An attempt to systematically collect information on current extent of different wetland types in different countries in the region should be carried out as a priority.
- A program should be established to monitor changes in the areal extent of rare and threatened wetland types once a baseline of the original or current extent has been determined.

- Standardised methodologies should be developed, and linked to the objectives of wetland inventory studies, such that for any given objective, standard information fields should be gathered using standard methodologies.
- A standardised (generic) database format (and software) should be developed for storage and extraction of local, national, and international wetland information that can be applied throughout the Eastern European region.
- More effort should be made to integrate wildlife surveys (especially waterfowl) and wetland surveys to avoid duplication of effort and to increase the wider applicability of information.
- Regional and national inventories should be made available in digital form as CD-ROMs or downloadable files from the Internet to enhance the access to the information and encourage greater levels of feedback on changes at the sites.
- A review should be undertaken on the applicability of land use and land cover mapping information for the monitoring of changes in wetland extent in the region.

9 Priority areas for wetland inventory

9.1 Status of national level wetland inventory information in Eastern European countries

Although it was possible to generate estimates of the national wetland resource in all but three Eastern European countries (Azerbaijan, Belarus, Bosnia and Herzegovina), much of the data was noted to be slim in volume – often amounting to no more than a paragraph or two outlining a country's approximate wetland resource (eg Croatia – Muzinic 1994).

The EEUR dataset revealed that in many instances, wetland inventories to date in Eastern Europe have examined wetlands of international importance only (eg Ukraine, Russia, Latvia and Lithuania). Some countries initially completed inventories of internationally important wetlands and then later extended their wetland inventory activities to wetlands of national importance, eg Slovak Republic (Slobodnik & Kadlecik, in development). Other countries have progressed even further, and have conducted comprehensive national wetland inventories encompassing internationally, nationally and locally important wetlands, eg the Czech Republic (Hudec et al 1993) and Estonia (Estonian Fund for Nature 1996).

Of the 22 countries in the Eastern European region examined in this review, only two of these can be said to have quasi-adequate inventory data on wetlands. These are the Czech Republic and Estonia, though it must be noted that even these countries do not have inventory material that cover the entire national wetland resource and all possible wetland types.

Countries which (on the basis of the EEUR dataset) have less detailed national wetland inventory material or material which is less comprehensive in scope and coverage are listed in column two (labelled 'some but inadequate national wetland inventory information') of table 9.1. These are Albania, Belarus, Bulgaria, Croatia, Georgia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Republic and Ukraine.

There was a noticeable lack of wetland inventory information for several countries listed in column one (labelled 'little or no national wetland inventory information') of table 9.1. These are Armenia, Azerbaijan, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Slovenia, and Serbia and Montenegro. It is possible that wetland inventory activities (in some form or other) occurred in the former USSR (an example would be the

MAR project, Olney 1965 *cited in* Scott & Jones 1995). After the creation of newly independent states such as Armenia and Azerbaijan in the early 1990s, it is likely that much of this information has become inaccessible due to the dissolution and creation of new governmental offices and departments.

This review did not attempt to access information generated prior to the dissolution of the USSR except where it was accessed incidentally. Greater resources than were available in this preliminary review would have been needed in order to adequately identify, locate and evaluate material from the former USSR. Most certainly the services of a translator would have been required, and such a mammoth task would have required specific in-country information and knowledge which were not available to the AEME team.

It should be noted that additional materials for Eastern Europe have been identified since the analysis stage of this review – particularly for Belarus (Belokurov 1998, Dorofeev 1993, Edwards & Prentice 1995), as well as an additional document each for Russia and the Ukraine (Chernichko & Siokhin 1993) – and it is likely that these will reveal new information. Our findings must therefore be viewed as preliminary.

Many specific types of wetlands were frequently ignored in wetland inventory activities in Eastern Europe, for instance, glacial, alpine and tundra wetlands, marine subtidal aquatic beds, and dune slacks. A common exclusion was smaller wetlands (for example <10 ha, and in some cases <100 ha). Artificial wetlands did not feature in many wetland inventories and must therefore be presumed to be a 'gap' in coverage. The notable exception to this is Latvia (Latvian Fund for Nature and Latvian Ornithological Society 1995) where artificial fishponds have been included in much of the wetland inventory work examined in this review.

The majority of wetland area estimates examined by this report were approximations (often based on dated aerial photography, soil and vegetation maps, and limited field studies). The resulting best estimates must therefore be viewed with caution since accurate results cannot be generated from such approximate data.

9.2 Relevance to previous studies

Hughes (1995) produced a review of the status of wetland inventories in Europe (encompassing some countries in both Eastern and Western Europe). She did not provide estimates of wetland area, but did provide a brief description of wetland inventories per country, and noted whether a national wetland inventory program was underway, planned or completed (table 9.2). Scott and Jones (1995) made a comparison between wetland sites within countries identified in the 1965 MAR project and those designated as Ramsar sites in the same countries by July 1993. This demonstrated that there had been significant progress in the wetland inventory of potential internationally important wetlands over a 30-year period. Table 9.3 takes this comparison one step further by the addition of Ramsar site information as of August 1998.

Whilst the EEUR dataset cannot claim to be totally comprehensive in its coverage, it is interesting to note that many of the countries which Hughes (1995) listed as having little wetland inventory material in 1995 (table 9.2) still appear to have little wetland inventory material (table 9.1). Countries that were omitted from the Hughes (1995) review 'due to a lack of available information' include Armenia, Azerbaijan, and Bosnia and Herzegovina. Based on the EEUR dataset these countries still appear to have little wetland inventory information.

The former Yugoslav Republic of Macedonia and Serbia and Montenegro were not included in the Hughes (1995) review; however, no wetland inventory information for these countries was

identified in this review. The current status of wetland inventory in these countries is therefore currently unknown. Hughes (1995) also omitted Moldova, Poland, the Slovak Republic and Slovenia from her review 'due to a lack of available information' but these countries now appear to have improved wetland inventory information. Albania, Hungary and Georgia had very little wetland inventory information and this situation does not appear to have changed.

Hughes (1995) also noted that Latvia, Romania, the Russian Federation, Belarus, Estonia and Lithuania have some (sub national) wetland inventory material, but that the coverage of the inventory material available was incomplete in coverage. Each of these countries were similarly identified by the EEUR dataset as having some but inadequate *national* wetland inventory material, with the exception of Estonia (Estonian Fund for Nature 1996) which has been undertaking rigorous and comprehensive wetland inventory activities.

Table 9.1 Status of national wetland inventory information in Eastern European countries based on the EEUR datase. Note: these are preliminary assessments only.

Little or no national wetland inventory information	Some, but inadequate national wetland inventory information	Adequate information available, but requires updating and more detailed surveys
Armenia	Albania	Czech Republic [1]
Azerbaijan	Belarus [2]	Estonia [3]
Bosnia and Herzegovina	Bulgaria [4]	
Macedonia	Croatia [5]	
Serbia	Georgia	
Slovenia [6]	Hungary	
	Latvia [7]	
	Lithuania [8]	
	Moldova	
	Poland	
	Romania	
	Russia [9]	
	Slovak Republic [10]	
	Ukraine [11]	

1. A comprehensive inventory of wetlands of local, national and international importance was published in 1993 by Hudec et al (1993). This material was obtained after the analysis stage of this review was completed; however, this source contains detailed wetland inventory information.
2. Additional wetland inventory material for Belarus has been identified since the analysis stage of this review which contains an overview of rivers, lakes, reservoirs, bogs, forested wetland and seasonally flooded meadows (Edwards & Prentice 1995). It does not constitute a national wetland inventory, but it does contain useful information such as values and benefits, threats, flora and fauna etc. This new information will be incorporated into any future update of the GRoWI-EEUR database.
3. Estonia is currently completing project WETSTONIA, which is undertaking separate inventory fieldwork missions of Estonian lakes, mires, wet forests, bogs, and meadows. A publication detailing the findings from the meadows inventory (Leibak & Lutsar 1996) has been incorporated in this review, however, it is uncertain as to whether information on the other habitat types has yet been published. Efforts to establish the current status of the WETSTONIA project are continuing.
4. A national action plan for the conservation of the most important wetlands in Bulgaria was prepared in 1994 which provided a summary of 7 wetland complexes in Bulgaria (Ministry of Environment 1994). The current status of national wetland inventory activities is unknown, and no other publications have been identified.
5. A limited preliminary national wetland inventory was completed by 1994, covering 30 sites (Muzinic 1994). Only the name, co-ordinates, area, and wetland type appear to have been recorded. The current status of this inventory is uncertain.
6. A national wetland inventory in Slovenia (incorporating a MedWet style database) is planned to commence in 1998/99.
7. An inventory of 7 potential Ramsar sites was completed in 1995 (Latvian Fund for Nature & Latvian Ornithological Society 1995).
8. A preliminary inventory of important wetlands in Lithuania was completed in 1995 covering just 9 potential Ramsar sites (Svazas 1995). A national inventory was initiated in 1997, which aims to inventory a total of 60 sites by end of 1999 (Balciauskas & Svazas 1998).
9. Additional material for Russia has been obtained since the analysis phase of this project, including an English translation of a Russian publication already incorporated (in outline only) in this review (Kamennova & Vinogradov in press).
10. The Slovak Environment Agency began a 10yr national wetland inventory in 1991. Some 2000 sites have been identified for inventory, and approx. 75% have already been inventoried. Inventory results to date are in Slovak (Slobodnik & Kadlecik in development). By completion date, the inventory is expected to be near comprehensive.
11. Additional material on internationally important wetlands in Ukraine has been obtained since the analysis phase of this project, which will be incorporated into any future update of the GRoWI-EEUR database (Chernichko & Siokhin 1993).

Table 9.2 Status of wetland inventories in Eastern Europe described by Hughes (1995)

Omitted due to 'lack of data'	Noted as poor national wetland inventory information	Wetland inventory material exists but incomplete coverage	Some wetland inventory activities in process	Planned wetland inventory activities
Armenia	Albania	Latvia	Latvia	Estonia
Azerbaijan	Hungary	Romania	Belarus	Lithuania
Bosnia and Herzegovina	Georgia	Russian Federation		Russian Federation
Moldova				
Poland				
Slovak Republic				
Slovenia				

Noted as having some national wetland inventory information	Notes on national wetland inventory (NWI)	Reference for NWI (full citation given in Hughes 1995)
Bulgaria	NWI completed 1993	Ministry of Environment (1994)
Ukraine	NWI underway in 1995	–
Czech Republic	NWI produced 1993	Hudec et al (1993)
Croatia	preliminary NWI	–

Table 9.3 Comparison of wetland sites in Eastern Europe listed by the MAR project, and by Scott and Jones (1995) and those designated as Ramsar sites in 1998

Country	# of sites on MAR list published 1965	# of Ramsar sites designated by July 1993	# of Ramsar sites designated by August 1998
Albania	0	Not a Ramsar party	1
Armenia	0	2	2
Azerbaijan*	1	Not a Ramsar party	1
Belarus	0	Not a Ramsar party	Not a Ramsar party
Bulgaria	4	4	5
Croatia	1	4	4
Czech Republic	3	4	10
Estonia	2	Not a Ramsar party	10
Georgia	0	Not a Ramsar party	2
Hungary	6	13	19
Latvia	1	Not a Ramsar party	3
Lithuania	1	Not a Ramsar party	5
Moldova	0	Not a Ramsar party	Not a Ramsar party
Poland	15	5	8
Romania	5	1	1
Russia	4	3	35
Slovak Republic	2	7	12
Slovenia	9	1	1
Ukraine	0	Not a Ramsar party	4
Yugoslavia**/Serbia and Montenegro	4	2	4

(adapted from Scott & Jones 1995)

* Ramsar site was designated by the former USSR: Azerbaijan has not yet acceded to the Ramsar Convention on Wetlands.

** Values for the former Yugoslavia.

Hughes (1995) noted that Bulgaria, Ukraine, the Czech Republic and Croatia all had some national wetland inventory material. With the exception of the Czech Republic, which has detailed national wetland inventory information (Hudec et al 1993), and based on the EEUR dataset, Ukraine and Croatia are still somewhat lacking in national wetland information in 1998 but have initiated national wetland inventory activities. Bulgaria has a national action

plan for the conservation of wetlands (Ministry of Environment 1994), but whether a national wetland inventory is underway is currently uncertain.

If we examine the information given by Scott and Jones (1995) (table 9.3), nine countries were not contracting parties to the Ramsar Convention in July 1993 (Albania, Azerbaijan, Belarus, Estonia, Georgia, Latvia, Lithuania, Moldova and Ukraine). By August 1998, only Belarus, Moldova and Azerbaijan still remain non-signatories to the Ramsar Convention. (The former USSR designated one Ramsar site in Azerbaijan but Azerbaijan has not yet acceded to the Convention on Wetlands.)

This means that since 1993 the following countries have become signatories to the Ramsar Convention: Estonia, Georgia, Latvia, Lithuania, and Ukraine. Each of these countries is undertaking wetland inventory activities (at some level), however, Estonia has completed some exceptionally comprehensive and detailed wetland inventories in this 5 year time period, and activities in the region are still continuing (Estonian Fund for Nature 1996, Leibak & Lutsar 1996, Rein & Kuresoo 1998). Estonia should be commended for having made such significant progress in such a short time period, and the approach used could serve as a demonstration model in the Eastern European region. The lessons learned and successes achieved could prove to be extremely pertinent elsewhere in the region.

Four countries have not designated any further Ramsar sites between 1993 and 1998; these are Armenia, Croatia, Romania and Slovenia. Some countries have designated a few additional Ramsar sites since 1993; these are Bulgaria and Poland. But the Czech Republic, Hungary, Russia, and the Slovak Republic have all substantially increased the number of wetland sites designated as internationally important wetlands in the 1993–1998 period.

10 Priority processes

This section provides brief recommendations pertaining to wetlands inventory activities as a whole. It proved beyond the scope of this study to recommend particular field survey methods, or to provide instructions for wetland inventory activities. Taylor et al (1995) covers the relative merits and disadvantages of wetland inventory methods used in southern Africa and these are equally applicable in other regions.

Similarly, it would not be appropriate to enter the debate on traditional field survey techniques versus remote sensing techniques (again these are discussed admirably by Taylor et al (1995) and Grainger (1993) from analogous forestry studies). However, the process of extracting and analysing data from the sources examined in this review, has revealed common problems that could be easily avoided if wetland inventory data were presented in a particular fashion. If certain specific data were routinely recorded for the benefit of the reader (such as date of survey, objectives, and wetland definition and coverage) then extraction of information would be much easier.

10.1 Establishing inventories

10.1.1 Preparatory activities

- A thorough review of previous studies and surveys undertaken should be conducted prior to any wetland inventory activity, to delineate gaps and to benefit from lessons learned or mistakes made. This should also include less obvious sources such as academic material and conference material, as well as conventional wetland inventories.

- Adequate time and resources should be allocated (by funding bodies and implementing agencies) to review, and obtain existing wetland inventory material for any given region or country. As stated by Taylor et al (1995), it requires time and effort to establish the existence of sources of information already available, and often there is repetition of previous survey work because adequate efforts to assess the existing information base have not been undertaken. This project has identified several cases where source material has quoted wetland area estimates taken from studies that had been comprehensively updated by more recent studies, and therefore their estimates were out of date, and had been supplanted by more recent and accurate data.

10.1.2 Background and setting to wetland inventory activities

- Information such as the history, development and rationale of wetland inventories is crucial for understanding the context of these studies and should be described briefly within reports. Information detailing contact persons and addresses is very helpful to successive workers, as are plans for future activities. If the surveys are part of a longer-term study, this should also be stated.

10.1.3 Objectives

- The objectives of wetland inventories should be identified prior to the commencement of wetland inventory activities (particularly those involving fieldwork). The objectives of wetland inventory activities should play a key role in choice of the most suitable wetland inventory methodology to be used in any given particular inventory program.
- Wetland inventory activities should aim to make provision for regular updating of wetland information, and where appropriate should make provision for monitoring changes in extent, distribution and loss of wetlands.
- The objectives should be clearly stated in wetland inventory reporting and published material.
- Those coordinating wetland inventory activities should specifically aim to widely disseminate wetland inventory material, and should aim to permit ready access to wetland inventory information. This objective should feature in all future wetland inventory activities.

10.2 Updating or extending inventories

10.2.1 Wetland coverage

- Certain wetland types were commonly excluded from wetland assessments and these included artificial wetlands (eg fish ponds, rice paddy, reservoirs and dams) and natural wetlands including dune slacks, humid sands, dambos, wet mesotrophic grasslands, seagrass beds, maerl beds, coral reefs, glacial and alpine wetlands. More attention should be paid to these and similarly overlooked wetland types in future inventory studies.

10.2.2 Wetland definitions and classification of wetlands

- Clear distinction should be made between the description of ‘marine wetlands’ and ‘coastal wetlands’, and ‘inland wetlands’. Extracting information on even broad wetland categories is difficult when different definitions of habitats are used. Some authors use, for example, the term ‘coastal wetlands’ to mean strictly saline and brackish habitats and others use it to mean wetlands in the coastal zone (which often for practical purposes mean coastal lowlands and incorporates wetlands which experience no tidal inundation).

- A definition of wetlands should be always be given, and it should be expressly stated whether habitats such as floodplains, and open water bodies have been included in the definition and whether they have been included in a wetland survey.
- Where wetland classification systems are used, these should be stated and adequately referenced.

10.3 Inventory content

10.3.1 Minimum information fields

- Wetland area estimates and identification of whether wetland area estimates are minimal, maximal or average values (stating number of years and which years the average value is based on).
- The geographical coordinates and general location of wetlands should always be included, so that discrepancies involving the names of wetlands can be identified by location. (For countries that are newly independent, it is very difficult identifying wetlands that have been renamed, and adequate geo-referencing may reduce this difficulty.)

10.3.2 Recommended information fields

- Objectives of study.
- Dates of field work (including season) and collation should always be included, as well as the known dates of any compiled information.
- Description of methodologies used in fieldwork.
- Resolution capabilities of remotely sensed data.
- Definition of wetland used.
- Classification scheme used (eg Ramsar, Cowardin, Corine etc).
- Inclusions/exclusions in coverage (eg excluding wetlands of less than 100 ha, or excluding open water bodies etc).
- A *summary* of the coverage and characteristics of the wetland resource including tabulations where possible.
- Contact points for data custodians or publishers and their institutional details.
- Contact details of persons undertaking fieldwork should always be provided in fieldwork.
- Full referencing of primary source material should always be provided in reviews/collations.
- Ramsar Information Sheet data fields.

10.4 Wetland values and benefits

- Information on wetland values and benefits should be included in wetland inventories. As a minimum this should constitute a textual description of benefits, but preferably should indicate the economic values for wetland goods and services.
- A structure to aid the assessment of wetland benefits and values using simple means and local knowledge of wetland sites should be developed for use in conjunction with wetland inventories. This could take the form of a key or questionnaire which could be spilt into sections under the headings of fisheries, water supply, tourism, education, hydrological

functions etc, and the assessor answer general questions under the appropriate headings. Or it could take the form of a table that should be completed, with sections containing questions such as 'approximately how many artisanal fishermen use this site? Is this seasonal? Approximately what is their daily/weekly catch?' Or this could take the form of a matrix, which the assessor simply adds tick marks where a particular good or service is important. More effort should be put into developing simple ways of calculating the approximate total economic value of a wetland site in a standardised manner.

- The findings of wetland inventories that complete preliminary assessments of the values and benefits of a particular wetland site should be widely disseminated in order to demonstrate the values and benefits to policy makers and management authorities.

10.5 Temporal scale/updating programs

- It could be argued that low resolution comprehensive national surveys should be undertaken as a priority to at least identify wetland locations for more detailed study later. However, in terms of resource conservation, repetition of detailed surveys at sites thought to be at risk should also be a priority undertaking.
- Wetland inventories must be regularly reviewed and updated, otherwise data are likely to be lost, become out of date and become of historical interest only.

10.6 Presentation of data

- A summary of the coverage and characteristics of the wetland resource should preferably be included in all wetland inventory reference material. It is exceedingly difficult to construct a useful overview of an inventory reference by extracting values and statistics from reams of text entries.
- Local naming conventions of wetlands or locations are often ignored, and authors may use their own 'version' of a local name for a particular wetland. There are obviously difficulties in translation, but more efforts should be made to ensure that the local and English (and French, or Spanish as appropriate) version names are included in inventory material if it is intended for use beyond the local area. A guide to the pronunciation of local names may also be useful (particularly where these names have not previously been recorded, and are perhaps only known by local names) although this may not be practicable for directory type inventories.
- Key quantitative wetland inventory information should preferably not be presented in block text format (where data such as coverage and loss estimates lay hidden in sentences, perhaps with imprecise wording leading to an ambiguous interpretation). This would aid the input of existing and future inventory information into database format.
- Maps of habitats and atlases should also present summary area and type by area information. Many maps examined did not contain a scale and/or other fundamental spatial reference information such as geographic coordinates. It is very difficult to manually extract useful inventory or management information out of most of the maps examined for potential inclusion in the Eastern European dataset.

10.7 Handling and storage of wetland inventory information

- Every effort should be made to store both the paper and electronic versions of wetland inventory information with both those coordinating or conducting wetland inventory, and

also with international organisations such as the Ramsar Bureau and Wetlands International or a central clearing house (if one is developed).

- Electronic forms should preferably be stored in some format which is readily translatable into either word processing packages or commonly used databases.
- A standardised (generic) database format (and software) should be developed for storage and extraction of local, national, and international wetland information that can be applied throughout the Eastern European region.

10.8 Availability and dissemination of inventories

- Much material is currently available in draft format, remains unpublished or has a limited distribution. Considerably more effort should be devoted to ensuring that existing draft reports are finalised, and resources permitting, published, preferably with some or all of the information made available on the World Wide Web.
- Those undertaking to produce national bibliographic databases, should also be aware that the usefulness of such information is severely limited if there is no provision for supplying the references to those who need them. Funding should be made available to ensure that national bibliographic databases don't simply supply a list of references, but can also provide copies of the material upon request. The existence of such databases should also be more widely advertised.
- More emphasis should be directed toward publishing electronic format material (eg World Wide Web presentations) as well as any paper versions of reports.
- A central clearinghouse or structured information retrieval system for wetland inventory material should be put in place. It should be noted that identifying and obtaining wetland inventory material for a particular country may be largely dependent on a network of contacts and may chiefly rely on key individuals and/or organisations to supply or provide access to data. It is likely that these persons and organisations receive repeated requests for information and a positive result often depends on the goodwill and resources of these key individuals and organisations. The current situation is that a person or agency seeking information must first identify the ‘key players’, which in itself is often a time consuming process. The retrieval of information can occasionally be restricted due to deliberate actions on the part of some individuals who see a request for information as an opportunity to offer their services for substantial fee rates, and who it appears deliberately withhold information to increase their bargaining power.

11 Specific recommendations

The reader should also consult sections 8 and 10 for more detailed recommendations

- Every effort should be made to complete existing preliminary national wetland inventories. Based on the EEUR dataset these include Bulgaria, Croatia, Lithuania, Latvia and the Russian Federation.
- Every effort should be made to establish national wetland policies and establish national wetland inventory programs as a priority.
- The approach used by Estonia for wetland inventory activities could serve as a demonstration model in the Eastern European region. The lessons learned and successes achieved could prove to be extremely pertinent elsewhere in the region.

- The current trend to produce wetland inventory material closely following the format given in the Ramsar Information Sheets (RIS) should continue. This should serve to aid management of trans-boundary wetlands and should facilitate regional and international wetland assessments that can be utilised in European (and global) policy and planning initiatives.
- An intensive review of information generated prior to the dissolution of the USSR could potentially fill some information gaps that presently appear to exist in former USSR countries. A thorough review of such material should be undertaken prior to commencing comprehensive surveys in these newly independent states. This would serve to ascertain where work has already been completed and would provide potentially useful baseline information with which any new material can be compared.
- Wetland inventories should be undertaken (whether as part of a national wetland inventory program or not) in those countries which currently have little wetland inventory information. Based on the EEUR dataset this includes Armenia, Azerbaijan, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Serbia and Montenegro, and Slovenia (although it is known that Slovenia already has plans to commence national wetland inventory activities in 1998/99).
- There should be greater dissemination of existing wetland inventory information. Existing draft reports that have been produced in recent years with the assistance of NGOs should be published as soon as possible. Much useful and pertinent draft material has been uncovered which has never reached external audiences.
- Greater use of the World Wide Web as a publishing medium should be encouraged. This may be of particular use where finances are unavailable to produce paper publications of reports which have never progressed beyond the draft stage.
- Information about the objectives, wetland definition, wetland classification, wetland coverage (particularly inclusions and exclusions of particular wetland types), survey or compilation dates, and data custodians should be included in wetland inventories as a matter of course.

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Our sincerest apologies to any person or institute we may have inadvertently omitted from this list.

Annex 2 Best estimates of wetland coverage

(see section 3.3 for a list of countries omitted from this section)

	Country name (& Code) ALBANIA ALB		Area (ha) Wetland				
			MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	20,000	0	0	20,000	date of extraction 14 August 1998; despite some inland and man-made wetland types, the site is completely coastal/marine
2	IUCN 1993	111	?	?	?	0	In the report it states" the wetlands of Albania are poorly known" . 4 important lakes are named, and it is noted that there is 400km of coastline, which includes "extensive marshy shores"
3	Britton & Crivelli 1993	505	0	35,000	0	35,000	Coastal lagoons, non tidal salt marsh, freshwater marshes and forested wetlands are also noted as being present, but no area values are available.
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			20,000	35,000	?	55,000	

Notes/comments on best estimate

The available information is very limited and so the best estimate must be regarded as approximate

Date of best estimate 26-Aug-98

	Country name (& Code)						
	BULGARIA			***Area (ha) Wetland***			
	BGR		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	1,804	999	0	2,803	Date of extraction 14 August 1998; limited man-made area included with inland
2	IUCN 1993	372	0	10,000	220,000	230,000	In the report it states that " Bulgaria has few natural wetlands"
3	Ministry of Environment 1994	123	0	0	0	11,000	Covers natural wetlands only
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			?	10,000	220,000	230,000	

Notes/comments on best estimate

Estimate on coastal cannot be used from Ramsar, since Ramsar does not cover wetland areas exclusively.

Date of best estimate 26-Aug-98

	Country name (& Code)						
	CROATIA			Area (ha) Wetland			
	HRV		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	11,500	64,901	4,054	80,455	Date of extraction 14 August 1998; all man-made type areas except "1" have been included under inland, since the sites where they occur are largely inland, and areas could not be split.
2	IUCN 1993	111	?	45,000	0	45,000	In the report it states that " The Sava River valley and Kopacki Rit complex contains approx 45,000 ha of alluvail forest which is regularly flooded." No other estimates of area are provided.
3	Muzinic 1994	121	0	?	?	116,423	Estimates result from a preliminary national inventory. It is believed that there are more wetlands which have not yet been included. However site by site information is provided, (in Croatian) in the inventory
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			?	?	?	116,423	

Notes/comments on best estimate

No best estimate could be made for coastal, inland and man-made. The Ramsar database does not cover the entire country at all, and does not list wetland area exclusively. The IUCN reference only covers 2 areas. The Muzinic reference does not specify areas according to coastal, inland or man-made.

Date of best estimate 26-Aug-98

	Country name (& Code)						
	CZECH REPUBLIC			***Area (ha) Wetland***			
	CZE		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	0	30,028	7,863	37,891	Date of extraction 14 August 1998; inland and man-made areas are estimates
2	IUCN 1993	111	0	300	49,000	49,300	In the report it states that " Natural lakes are rare," but that there "are 160m small glacial lakes in the high Tatra.The existence of lowland floodplains (inc riverine forests,wet meadows, & oxbows) are mentioned but not described or quantified
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			none	?	49,000	49000	

Notes/comments on best estimate

The inland area for Ramsar cannot be used, since it does not cover wetlands exclusively.

For the total wetland area, the figure is a large underestimation of the real situation, but this is the only conclusion that is possible from these data.

Date of best estimate 26-Aug-98

	Country name (& Code)						
	ESTONIA		Area (ha) Wetland				
	EST		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	82,330	133,620	-	215,950	Date of data extraction August 14th 1998
2	Estonian Fund for Nature 1996	105	46,989	121,457	0	168,446	28 sites of international importance have been listed in this inventory. Only 12 of them are described (as 12 proposed Ramsar sites) Values do NOT including Matsalu Bay,hence why value appears low..
3	Kuresoo 1998	103	?	?	?	646,851	10 sites (the existing Ramsar sites) are described (in Estonian), with English summary. However, Matsalu Bay is listed as 476400 ha, whereas all other sources list it as 48640ha, hence why estimate appears high.
4	IUCN 1993	111	0	1,752,200	?	1,752,200	Inland wetlands includes 992,200 peatlands: 260,000 wet meadows: 500,000 wet forests.
5	IWRB Natnl. Reports 93-95	504	0	0	0	4,521,500	Only a total value for " Estonian mires" (including fens & bogs) is provided. Estimate should be reliable.
6	Leibak 1996	117	0	22,200	0	22,200	Estimate is comprised of 5100 ha of coastal wet meadows, and 17100ha of floodplain meadows. Comprehensive assessment.
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			?	?	?	4,543,700	

Notes/comments on best estimate

Note that there is discrepancy between estimates for nationally & internationally important sites (ref 1-3).These are not used for the best estimates.
The total best estimate is derived from refs 5+6.It is not certain whether reference 5 includes wet forests, though it is likely that it does since the value given is much higher than that of IUCN (which apparently does include wet forests)

Date of best estimate 29-Aug-98

	Country name (& Code)						
	GEORGIA			***Area (ha) Wetland***			
	GEO		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	33,710	513	-	34,223	Date of data extraction 14th August 1998
2	Lansdown 1996	107	37,145	0	0	37,145	number of sites are not given, but all sites are within the Kolkheti lowlands complex. Inventory covers only small proportion of wetlands in Georgia, 'cos only covers wetlands in Black Sea coastal region
3	State of the Envt report www 1997?	112	36,301	1,079	0	37,379	Inventory is of the Black Sea lowlands. Value for marine encompasses wetland complexes & includes many of the inland types also. Value for inland is strictly inland only. Only the total value can be considered reliable.
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			37,145	1,079	?	38,224	

Notes/comments on best estimate

No other data was identified in time for the preparation of this preliminary report. No information on manmade wetlands was uncovered.
Data from the Lansdown and the SoE reports have been combined to derive a best estimate

Date of best estimate 1-Sep-98

	Country name (& Code) HUNGARY HUN		Area (ha) Wetland				
			MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	-	125,322	24,519	149,841	Date of data extraction August 14th 1998
2	IUCN 1993	111	0	50,000	26,000	76,000	Values for inland are riverine forest on the Danube &Tisza rivers. Also mentioned in the publication are the existence of soda lakes, mires, & moorland associations,but these are not described.
3	State of the Envt report www 1997?	114	0	13,822	8,354	22,176	Value for inland is described as area of 'reeds' in report. Value for manmade is fish pond area. No other data provided in the report.
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			none	50,000	26,000	76,000	

Notes/comments on best estimate

The SoE report seems to be a severe underestimate appears to only cover 'reeds' and manmade wetlands, and therefore the IUCN data has been used, which is also likely to be an underestimate

Date of best estimate 1-Sep-98

	Country name (& Code)						
	LATVIA		Area (ha) Wetland				
	LVA		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar Database	None	19,300	24,000	-	43,300	Date of extraction August 14th 1998
2	State of Envt. www report	109	0	640,000	0	640,000	Value given is for inland bogs, it is not stated whether these are forested or unforested. www page is a based on a publication which we have not been able to obtain or ascertain the reference details.
3	Latvian Fund Nature et al 1995	110	142,600	93,150	3,500	239,250	Grand total = estimate of shadow and Ramsar sites only (7 sites) . Many of the wetlands are complexes of various wetland types, therefore the totals for each category (marine,inland, manmade) are only approx values.
4	Latvijas Mitraji un Ramsares Konvencija 1998	108	?	?	?	264,000	Estimate is for 12 sites (includes 3 Ramsar sites and 9 shadow Ramsar sites). Wetland types unknown. (language =Latvian)
5	IUCN 1993	111	0	640,165	0	640,165	Value for inland is for mires only.
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			142,600	640,165	3,500	786,265	

Notes/comments on best estimate

The SoE report & the IUCN report are in close agreement for inland wetlands. The higher value provided by IUCN has been used for the inland best estimate. No other data for coastal & manmade wetlands have been identified other than the Latvian Fund for Nature & so this has been used for the coastal & manmade best estimates, although the values must be regarded as approximate.

Date of best estimate 1-Sep-98

	Country name (& Code) LITHUANIA LTU		Area (ha) Wetland				
			MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar Database	none	23,950	26,501	-	50,451	Date of data extraction August 14th 1998
2	Balciauskas & Svazas 1998	102	?	?	?	120,000	The types of wetlands are not described, but the total value given here is the total area of potential Ramsar sites (thought to include existing Ramsar sites)
3	Svazas 1995	104	14,000	19,362	0	33,362	9 internationallly important sites are listed. Most of these are wetland complexes, however, they have been broadly ascribed to the Marine/coastal and inland types.
4	Svazas 1998	106	?	?	?	0	Source is in Lithuanian and area figures did not seem to be included
5	IUCN 1993	111	0	507,080	0	507,080	Value for type O inland is for lakes (this may include lakes smaller than 8 ha, though not known). Value for type Ts inland is flood meadows and type U is peatlands (not stated whether forested or unforested)
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			?	507,080	?	507080	

Notes/comments on best estimate

The only estimate that can be regarded as comprehensive in its cover is the IUCN reference, the others cover either nationally or internationally important wetlands. Therefore the IUCN reference has been used for the best estimate

Date of best estimate 1-Sep-98

	Country name (& Code)						
	MOLDOVA						
				Area (ha) Wetland			
	MDA		MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	IUCN 1993	111	?	?	?	?	No values were provided and it is stated that "there appear to be no internationally important wetlands in Moldova"
2	Lansdown 1996	107	39,844	0	0	39,844	Total value given covers 11 sites, 2 of international importance (together covering 14764 ha). Inventory covers most of wetlands in Moldova except high altitude lakes.
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			39,844	?	?	39,844	

Notes/comments on best estimate

The Lansdown inventory claims to cover most of wetlands in Moldova except high altitude lakes, and is the only data which has been identified to date for MDA

Date of best estimate 1-Sep-98

	Country name (& Code) POLAND POL		Area (ha) Wetland				
			MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	18,247	67,973	4,235	90,455	Date of data extraction Augsut 14th 1998
2	IUCN 1993	111	0	1,636,927	0	1,636,927	Value given in type U inland is peatlands (unknown whether forested or unforested) Also listed 18000km of rivers, 509km of coastline (mostly sandy). it is mentioned that fishponds are very common, & that the largest of these (a complex) covers 6521 ha
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			?	1,636,927	?	1,636,927	

Notes/comments on best estimate

No other comprehensive estimate of wetlands in Poland was identified, other than the IUCN report and therefore this has been used for the best estimate. This value is an underestimate since it omits coastal wetlands, and manmade wetlands.

Date of best estimate 1-Sep-98

	Country name (& Code) ROMANIA ROM		Area (ha) Wetland				
			MARINE/COASTAL	INLAND	MANMADE	TOTAL	NOTES
	Reference author	**Reference code**					
1	Ramsar database	none	323,500	323,500	-	647,000	Date of data extraction August 14th 1998
2	IUCN 1993	111	0	269,080	0	269,080	Value for type O inland is for lakes (unknown whether this includes lakes under 8 ha) Value for type U inland is described as 'mires' in the publication, ie not know whether forested or unforested.
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
Best estimates (ha)			?	269,080	?	269,080	

Notes/comments on best estimate

The IUCN reference is the only one which covers most wetland types, though it does not appear to include coastal wetlands.
The Ramsar site information cannot be used as a wetland estimate since this is the total area of the sites, not the wetlands

Date of best estimate 1-Sep-98

Best estimates (ha)	3,233,630	?	?	>3233630	

Notes/comments on best estimate

This best estimate is an underestimate since it incorporates only wetlands of international importance

Date of best estimate 1-Sep-98

Annex 3 Definitions and Abbreviations

Ramsar Region The Ramsar Bureau has adopted a system whereby countries are assigned to one of the following administrative and reporting regions: Africa, Asia, Eastern Europe, Neotropics, North America, Oceania, and Western Europe.

Regional Scale A scale which encompasses all, or the vast majority of countries within one Ramsar region.

Supra-regional Scale A scale which is greater than the Regional scale which normally encompasses several countries within any *two or more* Ramsar regions but not covering each and every country within those Ramsar regions.

Sub-regional Scale A scale which is greater than the national scale which normally encompasses several countries within any *one* Ramsar region but not covering each and every country within that Ramsar region

Wetland Inventory Assessment Sheet

This consists of a series of sheets designed to evaluate and summarise wetland inventory material. These are completed for each and every inventory source which contains useful coverage and attribute data. The details from these sheets are then entered into the GRoWI database. Wetland Inventory Assessment Sheets are not completed for sources which are deemed to be of little use for inventory purposes.

Wetland According to the Ramsar Convention, wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. In addition, the Ramsar Convention (Article 2.1) provides that wetlands: 'may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands'.

Wetland Inventory For the purposes of this project the definition of 'wetland inventory material' is necessarily broad, and encompasses standard wetland inventories carried out specifically for this purpose, but also includes material, which does not constitute a wetland inventory *per se* (eg Hughes et al 1994, A Preliminary Inventory of Tunisian Wetlands). Relevant NGO material, GO material, conference proceedings, workshop material and academic/research material were also considered as wetland inventory material.

eriss	Environmental Research Institute of the Supervising Scientist
GO	Governmental organisation
NGO	Non-governmental organisation
WI-A	Wetlands International–Americas
WI-AEME	Wetlands International–Africa, Europe, Middle East
WI-AP	Wetlands International–Asia Pacific
WIAS	see *Wetland Inventory Assessment Sheet*
GRoWI	Global Review of Wetland Resources and Priorities for Wetland Inventory