

Rhine 2020

Programme on sustainable development
Balance 2000-2005



Internationale
Kommission zum
Schutz des Rheins

Commission
Internationale
pour la Protection
du Rhin

Internationale
Commissie ter
Bescherming
van de Rijn

ICPR Programme 2020:

Balance 2000-2005
in the fields of ecology and water quality

I Ecology

The ICPR programme „Rhine 2020“ defines a number of objectives and approaches to be achieved by 2020 related to ecosystem improvement, restoration of the habitat patch connectivity and of the ecological continuity from Lake Constance to the North Sea. Furthermore, intermediate objectives have been fixed for 2005 indicating the desired progress in order to achieve the final objectives.

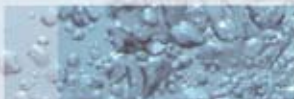
This balance presents a survey of progress achieved between 2000 and 2005 in four fields concerning the main stream of the Rhine:

- reactivation of overbank areas
- reconnection of alluvial waters
- increase of structural diversity of the banks of the main river and the oxbow lakes and
- improvement of river continuity



The balance additionally includes information on the development of species numbers of the macrozoobenthos depending on the oxygen development of the Rhine.

Most of the intermediate objectives defined for the implementation of the programme Rhine 2020 targeted at ecological improvement of the river Rhine have been achieved. Deficits are only registered with regard to the increase of structural diversity along the Rhine shipping lane. In this field efforts must increase if the objectives are to be achieved by 2020. Discussions on possible contributions to the enhancement of the banks of the Rhine by environmentally compatible river management have begun with



the Central Commission for Navigation on the Rhine representing the administration of navigation.

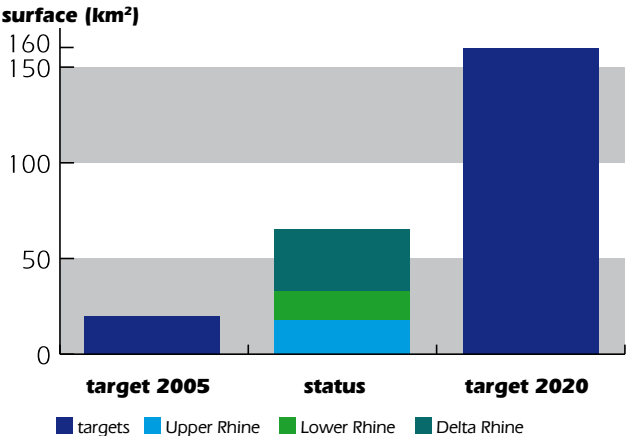
I.1 Reactivation of overbank areas along the Rhine

Objectives: 20 km² (2005); 160 km² (2020)

Balance: The objective set for 2005 has been achieved (on some 64 km²).

The objective set for 2020 is achievable. This assessment includes recently established, controllable flood storage areas which may be subjected to ecological flooding. A linking with flood prevention measures must still be strived for, taking into account that, in the field of ecology, qualitative targets must be maintained (among others flooding frequency according to ecological requirements). In some cases, the EC Water Frame Directive may offer new possibilities (for links) securing the achievement of objectives. The entire watershed of the Rhine is suited for these measures, but, due to natural conditions along the High and Middle Rhine, possibilities are very limited.

Reactivation of overbank areas



I.2 Reconnection of oxbow lakes and backwaters of the Rhine

Objectives: 25 (2005); 100 (2020)

Balance: The objective for 2005 has been achieved (31).

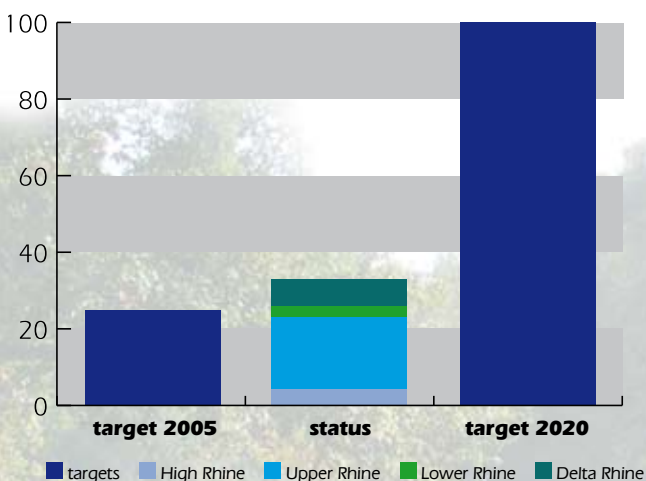
The objective set for 2020 is achievable. The objectives of the EC Water Framework Directive must also be considered. Wherever possible, a link with flood prevention measures must be strived for, taking into account that qualitative objectives for ecology are to be maintained (possible discrepancies: size of channels and/or water body).



The entire watershed of the Rhine is suited for these measures, but, due to natural conditions along the High and Middle Rhine, possibilities are limited.

Reconnection with alluvial waters

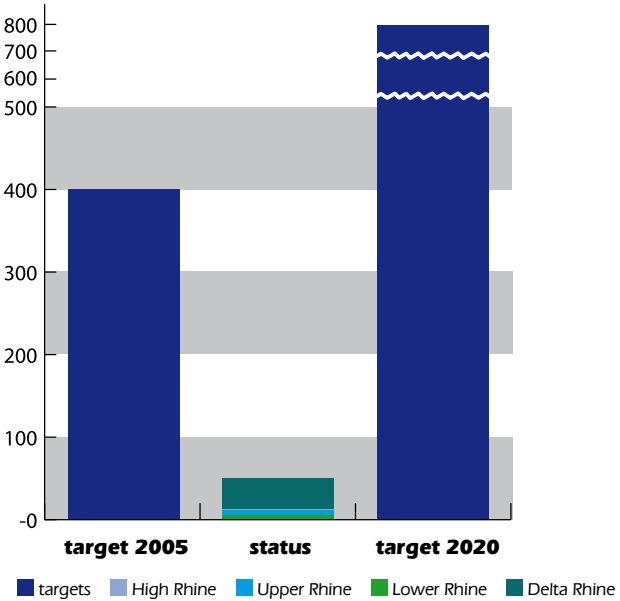
number



I.3 Increase structural diversity on the banks of the Rhine and its branches

Increase structural diversity of the banks

length (km)




Objectives: 400 km banks (2005); 800 km banks (2020)

Balance: The objective for 2005 has only been achieved to a limited extent (about 47 km).

In reality, the structural diversity has been increased to a greater extent as, in many cases, banks are also enhanced by reactivation measures for overbank areas (and creating) lateral water bodies. In many cases, this balance disregards such projects.

In order to achieve the objective by 2020, an effective linking with the objectives of the EC-WFD is required. In some cases a linking with flood prevention measures must still be strived for, taking into account that, for ecology, qualitative objectives are to be maintained (among others frequency of flooding).





In future, cooperation with the Central Commission for the Rhine representing administrations of navigation and maintenance of water bodies along the Rhine will be intensified. The entire watershed of the Rhine is suitable for these measures.

I.4 Continuity of the Rhine (state 2007)


Today, the only unhindered upstream migration route from the sea into the Rhine open to migratory fish passes by the Nieuwe Waterweg (Waal). Upstream migration through the sluices of the Haringvliet and the Waal is hardly possible. Periodically, upstream fish migration passing by the IJsselmeer closure embankment is possible. A further optimisation is being worked on.

Between 2001 and 2004, fish passages (bypasses) have been constructed for upstream migration at the three barrages on the Nederrijn/Lek near Hagestein, Maurik/Amerongen and Driel. Thus, fish may unhindered migrate upstream the three Dutch arms of the Rhine.

About 700 km of the Rhine freely flow up to the first upstream barrage across the Rhine at Iffezheim. Iffezheim included, 10 barrages on the Upper Rhine and 11 barrages on the High Rhine interrupt the continuity of the Rhine up to the Falls of the Rhine at Schaffhausen.

Fish passages for upstream migration have been constructed at the Iffezheim (2000) and Gamsheim (beginning 2006) barrages of the Rhine. More than 20 fish species have since been recorded to accept these passages.

The "Feasibility study for the restoration of the ecological continuity of the Upper Rhine for the fish fauna, phase 2 (proposals for solutions)" to be consulted under www.iksr.org (ICPR report no. 158) investigates into possibilities for the ecological restoration of the continuity of the river at the five hydro power stations Strasbourg, Gerstheim, Rheinau, Marckolsheim and Vogelgrün/Breisach; as a matter of principle, attempts at solutions have been found for all barrages, but the proposal made for Vogelgrün is still to be optimised.



On the High Rhine, the following hydro power stations are equipped with functioning fish passages: Birsfelden, Augst-Wyhlen, Rheinfelden, Ryburg-Schwörstadt, Bad Säckingen, Laufenburg, Albruck-Dogern, Eglisau, Rekingen and Schaffhausen. Only the Rheinau power plant downstream the Falls of the Rhine does not have any fish passage.

With the construction of three fish passages on the Nederrijn/Lek and of two fish passages on the Upper Rhine the objective „Improve the continuity of the main stream“ has been achieved for some sections. Further measures are required and are subjects of discussion between the states in the Rhine watershed.

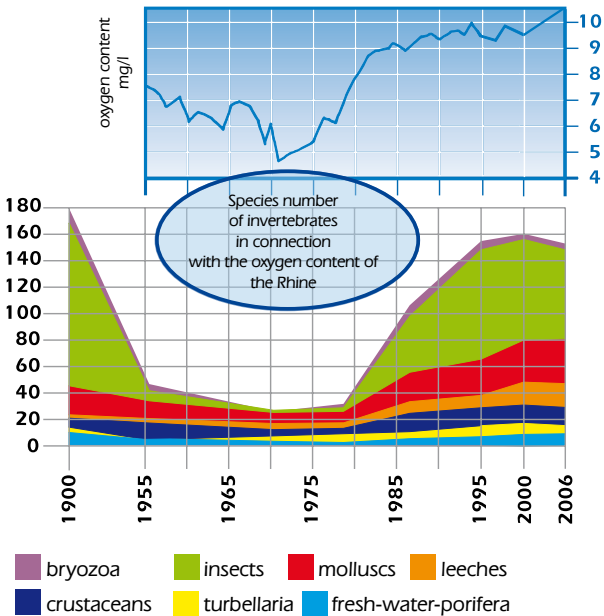
I.5 Development of the species number of macrozoobenthos and of the oxygen contents

Among others, communities in the Rhine depend on the water oxygen contents. The rise of the average annual oxygen content of Rhine water at the German-Dutch border reflects the pleasing success in the field of wastewater treatment in the period 1900-2006.

Parallel to improved oxygen content, micro-organism species, that is macrozoobenthos has distinctly increased, even though river training has clearly changed its composition and little demanding immigrant species prevail (in some sections by up to 90 %). Since 1995, the species number has more or less remained constant, however, many insect species abundant more than 100 years ago, such as the ephemera *Oligoneuriella rhenana* are still missing. Presumably, this is also due to the monotonous structure of river banks.



Development of the communities of the Rhine and average oxygen content of the Rhine at Emmerich



II. Water quality

During the last 30 years, Rhine water quality has distinctly improved. The ICPR rescue packages focussing on water protection interests of all states in the Rhine watershed massively reduced former vast inputs of noxious substances¹. Today, 96 % of the population are connected to municipal wastewater treatment plants. In 1985, only 85 % were connected.

However, a few substances are still detected in too high concentrations in water or suspended matter.

Only co-ordinated and continuous monitoring of the Rhine and its tributaries allow to draw conclusions for the development of water quality independently of annual variations of river flow and input.

¹ See ICPR brochure: Upstream – Outcome of the Rhine Action Programme, 2003



Target values help to assess the impact of monitored noxious substances on the environment and man.

„Target value achieved“ means that the substance concentrations

are below a defined maximum value. Maximum values take into account the following resources worth protection and their use:

- animals and plants
- fishery
- drinking water supply
- suspended matter and sediment
- marine environment

The following table of results for substances and substance groups shows that, according to measures at the international monitoring stations, only few substances did not achieve the ICPR target value. Substances still posing a problem are above all due to wide diffuse inputs into the Rhine, not to point sources.

The table shows that, in 2004, target values of 37 substances and of one group of substances were achieved, while those of 5 substances (cadmium, copper, zinc, diuron, benzo(a)pyrene) and for the group of PCBs were not achieved. Concentrations of 21 substances, one group of substances and the sum parameter AOX are near the target values.

Due to the further development of chemical analysis, other substances have recently become the focus of attention, such as remnants of personal hygiene products, pharmaceuticals and some hormone active ingredients.

Divide into groups of results for the year under report 2004

1. Group of results Failure to meet target value or distinct transgression	2. Group of results Values monitored near the target values	3. Group of results Target value met or value considerably below target value
Substances: 5 Group of substances: PCB	Substances: 21 Group of substances: PAK Sum parameter: AOX;	Substances: 37 Group of substances: DDT
cadmium copper zinc	arsenic chromium lead nickel mercury	aldrin azinphos-ethyl bentazone dieldrin endrin isodrin alpha-HCH beta-HCH delta-HCH malathione pentachlorophenol atrazine dibutyltin cation tributyltin cation triphenyltin cation tetrabutyltin mecoprop-p
diurone	gamma-HCH (lindane) isoproturone simazine	dichlorophenoxyacetic acid 1,1,1-trichloroethane trichloroethene tetrachloroethene tetrachloromethane trichloromethane 1,2-dichlorethane benzene
benzo(a)pyrene	total phosphorous- P ammonium-N hexachlorobenzene	3-chloro-anilin 2-chloro-anilin 3,4-dichloro-anilin 1-chloro-2-nitrobenzene 1-chloro-3-nitrobenzene 1-chloro-4-nitrobenzene 1,2,3-trichlorobenzene 1,2,4-trichlorobenzene 1,3,5-trichlorobenzene 2-chloro toluene 4-chloro toluene hexachlorobutadien
	Target values below limit of detection	
	azinphos-methyl dichlorvos endosulfan fenthion ethyl parathion methyl parathion trifluralin fenitrothion 4-chloro-anilin 1,4-dichlorobenzene	

■ nutrients

■ metals

■ volatile hydrocarbons

■ non volatile hydrocarbons

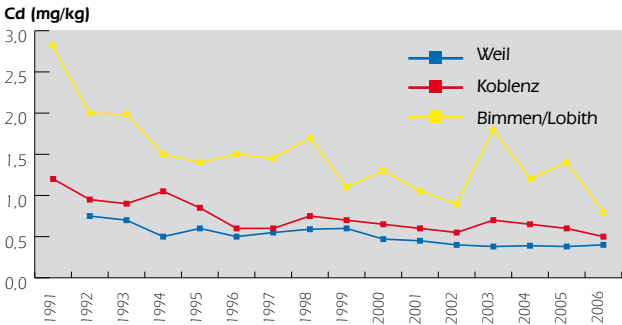
■ pesticides



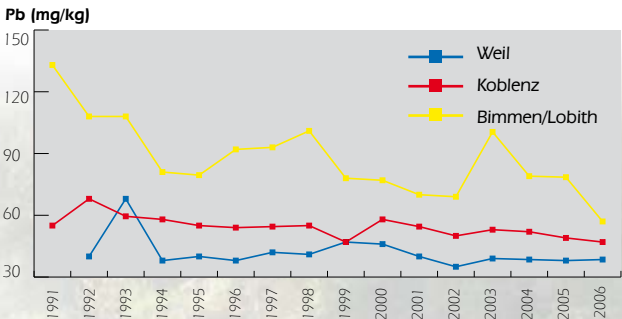
The 5 substances and the PCB group of substances, for which target values have not been achieved are still problematic. They primarily result from diffuse inputs into waters or former inputs, so-called historic contaminations and are more complicated to deal with in water protection than point source inputs.

The following graphs are examples for the development at three monitoring stations: **Weil** near Basel, **Koblenz** on the Middle Rhine and **Bimmen/Lobith** on the German/Dutch border. Today, heavy metals are only measured in suspended matter, while ammoniacal nitrogen is measured in the water phase.

Cadmium contents in suspended matter of the Rhine (1991-2006)

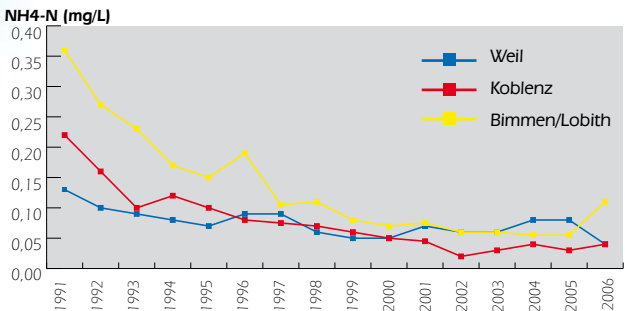


Lead contents in suspended matter of the Rhine (1991-2006)



There is no positive signal for the heavy metals cadmium, copper and zinc which are only measured in suspended matter since, in water, their concentrations are often below the limits of detection. Particularly copper and zinc which are omnipresent in our environment, e.g. in gutters and roofs, are due to diffuse inputs into water bodies originating from rainwater channels or rainwater overflow. Along the Upper and Middle Rhine, contents have almost not changed during the past 10 years, while they are still slightly decreasing along the Lower Rhine.

Contents of ammonium (ammoniacal nitrogen) in Rhine water (1991-2006)



Ammonium (ammoniacal nitrogen) concentrations mainly originating from wastewater treatment plants which, in 2004 were monitored to be near the target value have sunk to such an extent that the target value is expected to be constantly achieved in the near future.

In the beginning of the 90s the long term development of ammonium (ammoniacal nitrogen) contents shows an accumulation between the Upper and the Lower Rhine which has hardly been detectable in the last years.

International Commission for the Protection of the Rhine

Postfach 20 02 53 – D 56002 Koblenz
 Kaiserin-Augusta-Anlagen 15
 D 56068 Koblenz
 Tel: ++49-(0)261-94252-0
 Fax: ++49-(0)261-94252-52
 sekretariat@iksr.de · www.iksr.org

