Type 20: Very large sand-dominated rivers

Distribution in river landscapes and regions according to Briem (2003):

Large floodplains (over 300m wide)

Picture:

Lower Rhine (North Rhine-Westphalia). Photograph: G. Friedrich

Short description of morphology:

These rivers flow in single sinuate to meandering channels or anabranching multiple channels in very shallow lower river terraces (usually in glacial valleys). Besides the dominant sandy and gravel substrates, clay and organic material occur. Under natural conditions this river type carries lots of coarse woody debris. This usually consists of large logs or fallen trees, which remain stable despite the strong current. Large pieces of coarse woody debris in the main and side channels, can lead to a build up of debris dams of smaller pieces of woody debris and other organic matter. Characteristic is expansive lateral channel migration and furcation. Natural channel structures include bars, islands, scoured pools and deep furrows. The profile is predominantly shallow and wide; often fords can develop.

Abiotic profile:

Size class:	> 10.000 km² catchment size
Slope of the valley floor:	ca. 0,07 - 1,0 ‰
Flow category:	predominanty slow flowing current, with some quicker flowing reaches
Channel substrates:	predominantly sand and gravel of varying grain size

Physico-chemical water conditions:

calcareous

Conductivity [µS/cm]: 500 - 850
pH-value: 8,0 – 8,5
Alkalinity [°dH]:
Total hardness [°dH]:

Flow regime & hydrology:

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Characterisation of the macroinvertebrate community:

Functional Groups: This stream type supports a species rich community. Characteristic are large numbers of stenotopic, potamal species from various insect groups, which often develop abundant populations. The macroinvertebrate community is dominated by species of stable sand and gravel deposits. Typical are pelophile and psammophile insect species. Stone-dwelling organisms are rare and as a result of its gravel-dominated streambed more or less restricted to the Lower Rhine.

Selection of type-specific species: Some of the characteristic species of the detritus-rich, stable sand and mud deposits, include the mayflies *Ephemera vulgata*, *Ephoron virgo* and *Palingenia longicauda*, the dragonflies *Gomphus vulgatissimus* and *G. flavipes*, and the caddis fly *Molanna angustata*. Stone-dwelling species are the mayflies *Baetis fuscatus* and *Caenis horaria,* and the stonefly *Isogenus nubecula*.

Characterisation of macrophyte and pyhtobenthos communities:

The typical species for the very large lowland rivers is the pondweed *Potamogeton nodosus*. Together with other floating leave species like *Potamogeton natans, Nuphar lutea* or *Sagittaria sagittifolia*, it forms the characteristic macrophytes communities along the river margin.
These vegetation units represent the natural plant community of potamal lowland rivers.

Characterisation of the fish fauna:

Very large sand-dominated rivers are species-rich and support species of the bream and barbel regions, which can have a variety of different habitat requirements. Dominant species are typical river fish species with low habitat demands like bream, white bream, roach, perch, bleak. Typical for the fish community of the long middle reaches of this stream type are rheophilic species with large action radii (orfe, vimba bream and barbel).
Many water bodies in the floodplain are an essential habitat for typical lenitic species (e.g. tench, Crucian carp, bitterling, weather loach, belica and others). Local migratory movements between the main channel and floodplain water bodies are frequent. While some anadromous migrating fish travel to these river reaches to spawn (sea lamprey, river lamprey, houting), other migrating species use it as a corridor to their spawning grounds further upstream (e.g. salmon and sea trout). The fish community is complemented by numerous species from the tributaries.

Comments:

The stream type comprises several stream-section specific types. Presumable there are zoogeographical differences between several streams belonging to this stream type, like the Rhine, Elbe and Weser. For the entire Rhine (Alpine Rhine to delta) specific typologies for the various stream sections have been compiled (IKSR 2004).

Examples of typical streams

Makroinvertebrates: Rhine (Lower Rhine section, North Rhine-Westphalia), Elbe (Lower Saxony), Oder

Comparative literature (selection):

LUA NRW (2004) „Morphologisches Leitbild Niederrhein“, IKSR (2004)