Johann Gottfried Tulla, *The Rhine from Basel to Mannheim, with a Justification for the Necessity of Regulating this River* (1822)

Abstract

Johann Gottfried Tulla (1770–1828) was a government engineer from Baden. Trained in Saxony and France, he was one of the earliest proponents of straightening the Upper Rhine through hydraulic engineering projects that aimed to control flooding and recover agricultural land. Although his interest in regulating the Rhine dated back to the Napoleonic era, he published his most famous and influential pamphlets in 1822 (below) and 1825. Tulla's writings were published in the context of growing international cooperation to regulate river traffic along the Rhine among the bordering states—with that cooperation occurring within institutions established during Napoleon's rule and the Congress of Vienna. Tulla's project is often thought of in grandiose terms as an attempt to increase humankind's power over nature by canalizing the river, but it is worth noting that he emphasized ecological thinking and the balance of natural forces in both the motivation and execution of the engineering works. In both respects, Tulla's thinking bears comparison with that of German forest conservationists who aimed at sustainable management of natural economic resources. The rectification of the Rhine in its initial phases lasted from 1817 to 1876, but in many ways that first stage merely laid the groundwork for further engineering projects in the twentieth century that did, indeed, turn the Rhine into something akin to an artificial canal.

Source

The use of springs, streams and rivers for the elevation of culture and trade is among the subjects that deserve the attention of all governments.

The mountains and the plains, the forests, springs, streams, rivers and lakes, the swamps and steppes modify the climate, rendering it warmer and drier or colder and damper in the same country, according to differences in cultivation.

All matters and enterprises that affect the climate and the fertility of the soil must be in proper balance if the fertility of a land is to attain a high level.

The forests and springs, and the amalgamation of these and the confluences of the streams and rivers formed by the rain, snow and ice water that collect upon the surface have a specific effect upon the climate and fertility of a country.

It is a law of nature that rocks weather, steep slopes flatten out and become gentler, lakes and valley floors fill up, horizontal planes slope and earth and vegetable matter are transported from the higher into the lower-lying regions, continually renewing the fertility of the soil.

Without weathering and alluvial deposits, a sterile surface will remain sterile.

The most rapid transformations of infertile terrains into fertile ones occur through gentle inundation with water impregnated with soil and vegetable matter, therefore the plains—mainly former lakebeds—are only very fertile where many inundations have occurred. In all parts of the world, the lushest lands are to be found on the banks of rivers.

The larger and largest plants, the bushes and trees, which en masse form the forests, are destined by nature to ensure and maintain the fertility of the earth's surface. Like all plants, their chief nourishment is air and water. Many types of wood flourish in sterile soil, their rapid growth producing great masses whose transition into decay improves the soil and revitalizes and increases the vegetation.

The mountain forests prevent landslides and denudations. They, and the peat moss present here and there, hold the moisture on the mountain surfaces and feed the springs. The former are thus necessary for the maintenance of the requisite moisture, and the latter are at least useful.

The woodlands protect the smaller vegetation from heat, frost and wind; they offer protection on and near the river banks—if not from all attacks—then frequently from sudden changes in their course; they lessen the velocity of the lateral currents of overflowing rivers, according to the proportion of their stand, thereby causing a deposit or sediment of gravel, sand, earth, and vegetable matter, depending on the degree that they lessen the velocity of the currents and on the nature of the material carried away by the rivers.

Thus the woodlands, quite apart from the fact that human beings need wood, play a great role in furthering and preserving the fertility of the earth's surface. An excessive diminution of the woodlands overall, or only in individual districts, will and must necessarily adversely affect the climate and fertility.

Well-planned silviculture and drainage and irrigation systems, calculated according to the design and nature of the land surface and its situation, its location above sea level and distance from the equator, are the foundations for preserving the fertility of a country.

On both a large and a small scale, every irrigation system requires an adequate drainage system, and any cultivation demands the protection of the cultivated land from destruction. Thus, all flowing waters require first of all a proper outlet, through the creation of regular riverbeds, before proceeding to their use for irrigation and to the cultivation of the adjacent terrain.

In many cases, irrigation is the most effective means to improve the land and promote the growth of plants. It allows for the gradual transformation of steppes and swamps into the finest agricultural land. Irrigation systems thus deserve our very particular attention.

Rarely have irrigation systems been as extensive as they should be, and many streams and rivers flow away without being used, or properly used, for this purpose.

The originally separate populations that gradually arose, their division into larger and smaller sovereignties and the fragmentation of countries this engendered, have caused, and to some extent continue until very recently to cause, cultivation to be undertaken and extended without regard to an extensive whole, without setting up a system of cultivation, and without adequate cooperation, so that even now colliding interests, differing views and relations of private law place many obstacles in the way of preventing the attendant and ever-increasing disadvantages.

In some mountain ranges, pastures and tillage extend into excessively high elevations; agriculture has been extended too close to the banks of many rivers; the shore has been denuded of too many trees and bushes, or even where this has not occurred, the wood has not been used as a means of promoting sedimentation.

[…]

The fact that the regulation and maintenance of streams and rivers has not occurred in the manner that it should have may be attributed in part to the use of streams and rivers to run machines, which largely belong to private individuals.

The drainage and irrigation of a terrain, the safeguarding of the property of the riparians, log driving and navigation, demand the production and maintenance of regular riverbeds, river corrections or rectification, the creation of canals, etc., that is, the building of rivers and canals suited to the effects of streams and rivers and the aims of their use.

As a rule, the streams and rivers in cultivated countries should be canals, and channeling the waters should be within the power of the inhabitants. […]

Source: Johann Gottfried Tulla, *Der Rhein von Basel bis Mannheim mit Begründung der Nothwendigkeit, diesem Strom zu regulieren*. Leipzig, 1822, pp. 1–7. Available online at: https://digital.blb-karlsruhe.de/blbihd/content/titleinfo/5608652

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