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FLOOD-PLAINS IN THEIR RELATION TO LIFE.

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PHYSICAL geography has been systematized and reduced to a science in recent years. Similar organization of the truths of geography proper, human relations to environment, needs to be effected. Whenever the work of Davis in physiography is paralleled by effectively marshaling the facts and principles as to the life effects of relief and climate, then another great advance in geographical teaching may be expected.

While waiting for such able leadership, members of the Teachers' Geography Club of Boston have undertaken, by means of round-table conferences, to arrange their own conceptions of the causal relations of human life in orderly sequence. The plan adopted is to take the main physiographic features in turn, to briefly review their causal development and such of their characteristics as are most significant in their influence upon life, then to simply set forth the principles or general truths of geography related thereto. As leader of the Round Table, the writer prepared the following theses on flood-plains as a basis for discussion during the meetings of 1905-6. This treatment forms the basis for papers on the most important world flood-plains by members of the club, and for addresses on particular regions by geographical workers. In January Mr. Brown of the Worcester Normal School presented results of his field study on the Mississippi flood-plain and delta, and in February Mr. Huntington gave an account of his field work on the desert plains and waste fans of Central Asia. During 1906-7 the topic Mountains is to be studied.

INTRODUCTORY PROPOSITIONS

1. The peculiar and distinctive field of geography is the relations of man to his environment. Science that disregards this field falls short of being geography. (See JOURNAL OF GEOGRAPHY, Oct., 1905.)
2. Man, like all created life, is the product of his environment, a creature of circumstance. The winners in life's race have taken advantage of environment to advance; man is master of his fate.
3. Aside from the fundamental studies, those that train one to acquire and express thought, geography is most important. Study of the relations of peoples to their environment prepares the individual to take advantage of his own physical and social environment. The comparative study of home geography is the basis for civic improvement. Study of the com-

mercial geography of one's home community in its relation to the world is the foundation for business success.

4. Climate is the most important factor of environment. A favorable climate has been requisite to the evolution of any civilization in the East or West. Unfavorable climates forbid the development of civilized peoples. Climatic barriers separate races. Distinct climatic types produce like customs—occupations, clothing, dwellings—among distant and diverse races. Climatic differences form the oldest and the abiding basis of world commerce.

5. Within climatic limits physiographic forms determine the place, rate, and character of human advance. The abundance and variety of earth resources, which are associated with physiographic types, afford the basis for the multiplication of a people, and the development of their life to a complex civilization. Forms of land and water determine communications, therefore commercial routes and relations, city sites, and that interaction of peoples which is necessary for continuous advancement in civilization.

FLOOD-PLAINS

1. Flood-plains imply a preparatory period of erosion, in their normal development, and they are the result of river deposition. Originating where a stream reached base level, they extend down stream as deltas with their distributaries, and up stream as flood-plains proper with their natural levees and swamps.

2. The significant factors in their influence are (*a*) an ever fertile soil, combined with a sure supply of water, (*b*) free communication along a graded way, (*c*) association with bordering uplands. While these factors are constant, their life effects are radically varied according to the climate with which they are associated.

3. Flood-plains are either naturally clothed with luxuriant vegetation or potentially highly productive, and they normally support dense populations. On broad flood-plains belts of denser population form on the natural levees and beyond the swamps next the upland bluffs. A main center of population develops at the delta head, the focus of highways; others form wherever river meanders adjoin the uplands; and sea ports, likewise, often grow where the delta waterways approach the old coastline.

4. Flood-plains of the sub-tropical, desert belts. Type—Egypt. Civilization originated on the sub-tropical flood-plains of the East. There climate compelled irrigation, while physiographic conditions enabled it and rewarded it richly. Man was obliged to work, then enabled to live

without work. A tropical sun stimulated plant life, while dry desert winds invigorated human life. Virile nomad conquerors made the flood-plain farmers serfs, the basis of imperial leisure for advance to civilization. Communication within the plain was free, while bordering deserts gave both protection and commercial contact with other fields of life. Whenever government becomes inefficient, the desert returns to the river bank, as in Mesopotamia. Where temperate civilization controls, public works and production surpass those of indigenous races, and the desert recedes.

5. Flood-plains of the equatorial belt of heavy rainfall. Type—the Selvas. Savage life persists in the dense forests with which constant heat and heavy rainfall clothe tropical flood-plains. While both plants and animals live in the tree tops or the waters, the gloomy, pathless forests press man to the river bank. The climate enervates. It makes clothing needless and shelter simple. Fish, flesh, and fruit are as easily taken as it is difficult to maintain clearings for agriculture. There is neither stimulus nor opportunity for advancement. On a wide equatorial flood-plain, river-bank and upland border are dissociated, for a jungle is as impenetrable as the desert is an open roadway. Despite swamps, mosquitoes, and fevers, civilization seeks rubber and other forest products—steams up the rivers, establishes stations, employs natives, maintains clearings—but the forest remains savage.

6. Most temperate flood-plains were originally forest-clad, but have been or may be cleared. Their swamps did not nurture nations, but when mastered by civilization their fertile soils feed and clothe millions. In temperate climes favorable environments are widespread, and industrial life is complex: flood-plain farms there afford the simplest seat of dense populations. These, centered where river ports grow as railway centers, support a varied industrial life and commerce, while water-borne coal, or water-power and mines of the upland border, may further favor manufacturing. If the uplands are pastures, the flood-plain meadows supplement them in the grazing industry. Until the flood-plain swamps are drained, and the upland slopes terraced, the river ports are centers for the lumber trade and its dependent industries.

7. The flood-plains of glaciated regions are often terraced; they are flood-plains that have passed maturity. The Connecticut Valley is typical. The soils of upper terraces are sandy and porous, unfavorable to intensive agriculture. They are never reached by floods, hence afford safe home sites and roadways. The lower terraces possess fine and fertile soils similar to those of growing flood-plains. These soils so contrast with the stony and rather infertile soils of the bordering uplands as to make the

valley folk relatively prosperous and cultured. While a river bed on a growing flood-plain is perfectly graded, the waterway of a terraced flood-plain is broken by falls into separate reaches. The falls hinder early commercial development, but favor later industrial growth.

8. The alluvial fans and bolson plains of continental interiors are akin to flood-plains. They are graded deposits, whose finer soils and stores of water invite irrigation, and make them seats of relatively dense population engaged in intensive agriculture. Population is densest toward the outer margin of the fan, where the soil is fine and underground water is still available.

9. Interest in man's life leads to study of its conditioning environment. If there are brook or river flood-plains with clearly defined life relations in any school district, the study of this physiographic feature is appropriate to the home geography of fourth grade work. Otherwise it is best investigated when important world flood-plains and deltas are made known.

To know flood-plains and their life effects their own life story should be learned through field study. The flood-plains and deltas of gutters and roadside rills exhibit erosion, transportation and deposition on so small a scale and within so short a time as to be understood by children. Flood-plain meadows and brook deltas in ponds afford homely illustrations on a larger scale.

Some of the world's most important flood-plains and their characteristic life should be seen by students through the stereoscope, or at least studied by means of pictures. Important facts and effects should be emphasized by means of maps, notably the large scale government maps, and wall maps and diagrams prepared at school for class use.

Once the flood-plain type is known to a class, it serves as a basis for effective reviews and for intelligent advance, by means of comparisons.

10. The principles of geography appropriately required in the elementary school are simple and relatively few. But teachers should have a sound understanding and extensive knowledge of geographical relations; and may wisely teach, toward the close of an elementary course, such important causal connections as those just formulated for teachers. Texts and tests should emphasize only the following field of general truths:

Rivers deposit layers of detritus where the current slackens, forming deltas, flood-plains and alluvial fans. Their soil is fine, a mixture of many materials, renewed by every flood, ever moist or easily irrigated, hence fertile and favoring agriculture. Their level surface and slow river current favor transportation. Soil and surface favor production and commerce, therefore dense populations.

In the rainy tropical belt flood-plains are heavily forested, and are therefore usually sparsely populated by savages. Flood-plains in moist temperate regions, when cleared and drained, and in dry desert regions, when irrigated, support dense populations of civilized peoples.

The flood-plains and deltas of China, India, Indo-China, Mesopotamia, and Egypt, and those of the Rhine, Po, Amazon and Mississippi should be known as such and compared, affording a basis for the generalizations stated above.

While the above paragraphs are too condensed in style for easy reading, they serve well as the basis for exposition and for discussion by a round-table conference, and here they may excite thought if they do not altogether satisfy inquiries.

Certain of the great flood-plains of the world are the most densely inhabited districts known outside of selected small areas in some of our chief cities. The ease with which the necessities of life have been secured on certain of the flood-plains of temperate and subtropical Eurasia has made these areas the cradles of great nations and has enabled them to sustain a dense population from time immemorial. As is the case with all land forms, climate has a greater influence in determining the success of occupation than have the inherent features of the form itself. The Mackenzie has a great flood-plain with fine soil, abundant water and easy slopes but it is situated in an inhospitable climate and is not to be compared with the plain of the Mississippi, which is naturally no more fertile, but which has the advantage of a favorable location climatically. The same thing holds true of the great plains of northern Eurasia and to a certain extent is true of the tropical plains of the Congo and Amazon.

The more intimately we study the relations between peoples and their environments the more clearly we see how powerful an influence is climate. Broadly or narrowly considered climate is the great geographic determinant that influences man as to his occupations, manner of life, food, clothing, form of shelter, temperament, character of government to a certain extent and form of laws.