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The Benefits to be derived from the  
Improvement of Waterways

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SHIP-CANALS

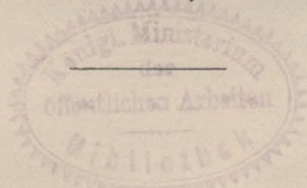
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REPORT

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## IMPROVEMENT OF WATERWAYS, AND SHIP-CANALS.

BY LEVESON FRANCIS VERNON-HARCOURT, M.A., M. INST. C.E.

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*The benefits to be derived from the improvement of waterways* depend upon the length of the navigation, and the nature of the traffic. When a country is comparatively small, and detached from any continent, like Great Britain, its rivers cannot be large except at their tidal estuaries, owing to their restricted drainage area; and therefore inland navigation can only be provided for by purely artificial works at a considerable cost. The extensive seaboard, moreover, in such a case, in proportion to the area, affords numerous outlets for the trade of the country; whilst the distance of any portion of the interior from the seacoast is so moderate, that a waterway is too short to compete on favorable terms with railways, unless there is a large traffic in bulky goods. Accordingly, the improvement of rivers for navigation in *Great Britain* has been, to a large extent, confined to their tidal portions; and no large inland navigation works have been recently carried out, except the Manchester ship-canal, which is more an extension of ocean navigation a few miles inland than an inland waterway. Inland navigation in England has been practically superseded by railways, except in rare instances, such as the Aire and Calder navigation, and the Leeds and Liverpool Canal, on which the traffic in coals and bulky goods has enabled these waterways to flourish in spite of brisk railway competition, and where the trade has been carefully fostered by successive improvements. Even in *France*, where inland navigation is encouraged and developed by the State and made free of tolls like the roads, the

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traffic by water is not very large, except on the north coast and along two or three waterways connected with Paris, owing, no doubt, to the extensive seaboard possessed by the country and its excellent system of railways. Indeed, the only inland waterways in France having a considerable traffic are those connecting Dunkirk and the Belgian coal-fields with Paris, the Seine between Havre and Paris, and from Montereau to Paris, the Marne and Rhine Canal at its connections with Paris, and to a smaller extent the Loire lateral canal with the canals joining it to the Seine. A large portion of this traffic consists of the carriage of coal and other bulky goods to Paris. The Rhone and the Saône have only a very moderate traffic; but they undoubtedly suffer from the bad condition of the mouth of the Rhone, and the absence of direct connection by water with Marseilles. Undoubtedly, France in general and Paris in particular, have derived great benefits from the progressive improvement of French waterways; but it is evident that inland navigation is only capable of the fullest development where large quantities of bulky goods have to be conveyed, and where there is direct access by water to the sea.

*The greatest opportunities for inland navigation* occur in the interior of large continents, where the seaboard is distant, and small in proportion to the area of the country, and where often the rivers are large and more or less navigable for long distances inland. The Rhine, the Danube, and the Volga are instances of such rivers in Europe; and the St. Lawrence, the Mississippi, the Amazon, and La Plata in America. These rivers, owing to the vast areas which they drain, possess not merely a larger channel, but also a more regular discharge, and consequently a moderate amount of improvement in places suffices to render them navigable for very great distances; and they form natural highways for the trade of the country. The economy, moreover, of transporting goods in bulk by water in such cases is fully realized on account of the long distances that can be traversed.

A remarkable instance of the benefits to be gained by even a small increase in depth of a river navigation, at a



long distance from the seacoast, is afforded by the canalization of the river Main from its junction with the Rhine up to Frankfort. Till these works were carried out in 1883-86, the navigable depth of the river in dry weather was liable to fall below 3 feet; and the traffic by water up to Frankfort did not exceed 12,000 tons in the year. As soon, however, as the minimum navigable depth was increased by canalization and dredging to  $6\frac{1}{2}$  feet, enabling vessels of from 700 to 1,000 tons to get up to Frankfort, the traffic rose to 300,000 tons. The traffic last year reached 709,000 tons; and the success of the works has led to the decision to augment the minimum depth to  $8\frac{1}{4}$  feet, and to enlarge the locks sufficiently to receive a train of six Rhine boats with their tug. Moreover, this great rise in river traffic has been effected in the face of keen railway competition; for, like the Rhine, the Main has a railway running along each bank.

The blasting of a channel through the "Iron Gates" of the Danube, and the removal of other rocky obstacles, will considerably extend the navigable capabilities of that river; and improvement works on the Rhine at the rocky rapids below Bingen, where the minimum depth is  $4\frac{3}{4}$  feet, would prolong the minimum navigable depth of  $6\frac{1}{2}$  from below this point right up to above Mannheim. The proposed connection of the Volga with the Don, by means of a canal, would greatly increase the commercial importance of the Volga by giving it access to the Black Sea, especially as its trade is considerably hampered by the shallowness of its outlets into the Caspian Sea.

The most notable instance of a large extension of inland navigation is afforded by the works which have surmounted the obstacles to navigation between the large lakes of North America and the St. Lawrence, and which have placed the important cities established upon the shores of these lakes in direct communication by water with the ocean. The benefits conferred by these works are sufficiently attested by the successive enlargements which a growing traffic and the increasing size of vessels have necessitated. This is a case where a large expenditure in perfecting the connecting links is most fully justified, and where trade is sure to follow



with rapid growth every increased facility afforded to navigation. These works must, indeed, be regarded as ship-canals connecting inland seas, possessing flourishing ports on their shores, with the ocean, and not as ordinary extensions of inland navigation; and it is under such special conditions that inland traffic by water is capable of attaining its highest development.

The moderate minimum depth of  $6\frac{1}{2}$  feet has been adopted as the standard depth along the main lines of inland navigation in France, and has proved capable of accommodating a large traffic; whilst on the Rhine, a similar depth has enabled Mainz, Frankfort, and Mannheim to acquire the importance of seaports, though situated inland, at a long distance from the ocean. Undoubtedly, a greater navigable depth is preferable, if it can be obtained at a reasonable cost, as it enables larger vessels to be employed, and therefore the carriage to be effected more economically, and can also accommodate a larger traffic. Nevertheless, though the navigable depth of the Lower Seine, proving the connecting link by water between Havre, Rouen, and Paris, has been gradually increased to  $10\frac{1}{2}$  feet, only the portion of the Lower Seine between the mouth of the river Oise and the St. Denis Canal has a larger traffic than the portion of the Upper Seine between Corbeil and Paris, where the minimum navigable depth is  $6\frac{1}{2}$  feet.

*The conditions favorable to the development of inland navigation* are a large area of country at a distance from the seacoast, a considerable traffic in bulky goods, the existence of large rivers stretching far into the interior, and large inland lakes or seas capable of connection by water with the ocean. All these conditions are found in North America; and, if France, with her extensive seaboard on the north, west, and south, has found it expedient, notwithstanding her network of railways, to improve, extend, and throw open her waterways, it is evident that a similar policy is far more important for America, where the distances from the ocean are so vast, the rivers so large, and the inland lakes so extensive. Railways undoubtedly enable traffic to be carried on in regions which waterways could not ap-



proach,— such, for instance, as the Denver and Rio Grande Railway in North America, and the Oroya and Transandine railways in South America. In level districts, however, canals are beneficial in supplementing and relieving railways, and furnish means for economical transport in bulk for great distances, when connected with and serving as feeders for a large river system. Moreover, whilst the construction of an extensive system of artificial waterways at the public expense may be open to question, there can be no doubt that river navigation, in a country like America, should be carried as far into the interior as practicable, especially as, in large rivers, moderate local improvements often open up a considerable length of navigation. Whilst the construction of local canals might be sometimes left to private enterprise, the improvement of the main waterways should be effected by the State; for the government can more easily raise the necessary funds, it alone can undertake a comprehensive scheme of improvement, extending over long distances, and occupying a considerable period in execution, it looks to the interests of the community at large, and not to local advantages, and it alone derives the indirect benefits resulting from the general development of the resources of the country. When the increase in traffic from any scheme of improvement of waterways is uncertain, the work can often, to a considerable extent, be carried out in successive stages, so as to proportionate the expenditure to the rate of growth of trade.

#### SHIP-CANALS.

Ship-canals, being intended to accommodate ocean-going vessels, are much larger works than ordinary inland canals. They may be designed for improving the access to a seaport of which the natural approach is circuitous or deficient in depth,— as, for instance, the Baltic and North Sea Canal and the Amsterdam Ship-canal,— or for bringing ocean-going vessels up to an inland town, such as the Manchester Ship-canal and the schemes for converting Paris and Brussels into seaports. Again, a ship-canal may cut through a



narrow neck of land, and thereby shorten the sea voyage between certain ports, of which the Corinth Canal is a notable instance, whilst the Florida Canal has been proposed with a similar object. The ship-canal, however, which present by far the greatest interest, are those which, cutting across isthmuses, materially shorten the routes between far distant countries. The first class, though constituting very important engineering works, possesses merely a local value; the second class shortens the distance between a few ports; but the last class is of universal interest to mankind, and modifies the lines of traffic between distant quarters of the globe.

SHIP-CANALS FOR PORTS.—The commercial success of the Manchester Ship-canal, 35 miles in length, will wholly depend on the trade of Manchester and the surrounding district, and on the development of traffic which cheaper transport and increased facilities may produce. Unfortunately, the actual cost of this work has largely exceeded the estimate,—a fate not uncommon in works of unusual magnitude and somewhat novel in character, where the actual work to be done is difficult to define with adequate accuracy at the outset, the nature of the soil is varied, additional works are found necessary during construction, and unforeseen contingencies arise. Manchester will, indeed, benefit equally, whatever may be the financial results to the shareholders; but the absence of a suitable return in such an undertaking prevents capital flowing in toward the promotion of works of a similar nature, and thus checks enterprise.

*The Amsterdam Ship-canal* provides a direct route with deep water between Amsterdam and the North Sea, and has thus secured the trade of this old commercial city from the serious injury with which it was threatened by the increasing draught of vessels, the improved access to Rotterdam, and the marvellous development of Antwerp. The Dutch government recognized the necessity of saving the capital of the country from the loss of commercial importance by the inadequacy of the depth of the Zuider Zee and the North Holland Canal to meet the requirements of modern ocean navigation; and it was, moreover, bound to give



similar facilities of access to the ocean to Amsterdam as had been conferred on Rotterdam by the works at the mouth of the Maas. Accordingly, though Amsterdam is not surrounded by the same thriving industries as Manchester, its prosperity is of national importance; and the government wisely came to its aid, in order to preserve and improve one of the main ancient outlets of the trade of the country. Owing to the shortness of the route, which is only 15 miles, the flatness of the country, and the existence of lakes along a considerable part of the distance traversed by the canal, the works did not approach in magnitude or cost the Manchester Ship-canal, whilst the sale of large tracts of land reclaimed from the lakes by the construction of the canal, enabled the government to recoup a portion of the outlay. Moreover, the country will be amply repaid for the expenditure by the preservation of the trade of the capital, and by the increased commerce which an improved waterway to a centre of trade has produced.

*The Baltic Canal* is of national importance to Germany in a somewhat different sense; for its object is to place Kiel, the naval arsenal of Germany, in the Baltic, in direct communication by water with the North Sea, and thereby improve the naval position of the empire, which has been considerably hampered by the comparatively small extent of its seacoast, and till the conquest of Schleswig-Holstein, by the inadequate depth of its Baltic seaports. To a large nation, with such an object in view, the cost of such an undertaking is of secondary importance; for in the event of war the value of this route might be very great. But, nevertheless, though the canal will have a length of 60 miles, a minimum depth of  $29\frac{1}{2}$  feet, and regulating locks at each end, in Kiel Harbor and the Elbe respectively, its estimated cost of £5,000,000 is less than the expenditure on the Manchester Ship-canal works; and, even allowing for a probable excess over the estimate, the expense will be worth the facilities afforded. Moreover, the new waterway should also prove very useful for the commerce of the country, by shortening the route from the Baltic ports to the North Sea by 240 miles. Irrespective of the naval advantages, the



government can raise the necessary funds for such a work on easier terms than a private company, and reaps all the indirect advantages of an increased trade. Government aid, however, can only be invoked where the proposed waterway is of national importance, and not in such a case as Manchester, where a provincial city away from the seacoast desires to be converted into a port, though in propinquity to one of the largest seaports in the world.

SHIP-CANALS ACROSS NECKS OF PENINSULAS.—Ship-canal of the second class are designed to shorten the sea route of vessels, by cutting a channel through a neck of land, so as to avoid a circuitous voyage round a projecting peninsula.

*The Corinth Canal*, for instance, has been constructed through the isthmus of Corinth, to afford more direct communication between some of the ports of the Mediterranean and the Black Sea, and also to avoid the stormy circuit round Cape Matapan. This canal, consisting merely of a straight open cutting only four miles in length, with protecting piers at each end, was proposed and actually commenced in the reign of Nero; but its execution has been reserved for the close of this century. The cutting, however, though so short, and mainly in rock, reaches a maximum depth of about 290 feet. The works, moreover, have been delayed by financial difficulties, owing chiefly to the increased excavation necessitated by slips, resulting from the unexpected dislocation of the strata traversed. The canal has been carried out by private French enterprise, as it will be principally used by vessels trading beyond the limits of Greece.

*The proposed Florida Canal* would considerably shorten the voyage between the ports on the east coast of North America and Galveston and the mouth of the Mississippi. This canal would be a much greater undertaking than the Corinth Canal, on account of the far greater width of the narrowest portion of the peninsula; and, unlike that canal, it would naturally have to be carried out by the nation through whose territory it passes. At present it can hardly be regarded as of sufficiently general commercial importance



to the United States to justify its being undertaken by the government ; but, if the prospects of traffic are adequate, it might be carried out by a private company, or still better at the expense of those States whose ports it would principally benefit. This route, however, would acquire greatly increased importance if a passage for vessels was obtained across the isthmus of Panama, especially if the more northern Nicaragua Canal was carried out, or the Tehuantepec Ship-railway was constructed ; for then the Florida Canal would be in the direct course between the eastern and western coasts of North America.

A similar object is being attained for coasting vessels up to 2,000 tons by the *Chignecto Ship-railway*, which will enable vessels trading between New England and the St. Lawrence River and Prince Edward's Island to shorten their voyage by over 500 miles of stormy sea, by being transported over a neck of land 15 miles wide, connecting Nova Scotia with the mainland. This enterprise, though simply an extension on a large scale of the system of inclines in place of flights of locks, adopted many years ago on the Morris Canal for vessels of 80 tons and at Georgetown for vessels of 115 tons, as well as in Great Britain and Germany, is of considerable interest, as the first work carried out for hauling sea-going vessels overland. The working of this ship-railway will afford an indication of the prospects of extending the system to the conveyance of the largest class of vessels, so as to offer another method of enabling vessels to traverse the isthmus of Panama. The completion, however, of these works, though not presenting any formidable difficulties, has been delayed by financial impediments, which appear inseparable from large undertakings where no return can be obtained for the capital expended till the works are finished.

A canal has been undertaken for providing more direct communication between the Sea of Azov and the Danube and north-western parts of the Black Sea by cutting through the isthmus of Perekop, which connects the Crimea with the mainland. This canal, with a length of 73 miles and a depth of 14 feet, will accommodate the coasting traffic along



the northern shore of the Black Sea and the Sea of Azov, and will place the navigation of the Don in more direct communication with the Danube and the Dnieper.

A scheme has been proposed for cutting a navigable channel through the Palk Strait, between Ceylon and India, and thus shortening the route to the east coast of India by about 350 miles. Another obstacle to direct navigation is the Malay Peninsula; and, if it was feasible to cut a canal through it, a much shorter route would be obtained between India and the China Sea.

Any works which materially shorten the routes of sea-going vessels are advantageous to commerce; but the extent of the barrier to be traversed and the uncertainties as to the actual cost and as to the amount of traffic which would be secured, render the prospects of success of a private company uncertain; whilst such works as have been referred to above are not of sufficient national importance to claim the appropriation of public funds.

*Inter-oceanic Ship-canals.*—The earliest instances of works carried out for connecting two seas, which are still in existence, are the Languedoc Canal, which connects the Bay of Biscay with the Mediterranean, and the Caledonian Canal traversing Scotland. Both these canals were constructed by the governments of the countries in which they are situated, and were designed solely for the benefit of these countries. The Languedoc Canal, constructed in the seventeenth century, though intended for sea-going vessels, has only the depth of the main inland waterways of France at the present day; but its enlargement to meet the present requirements of sea-going trade has been proposed. The advantages of the route for shortening the passage between the western and southern ports of France are evident; but the length of the canal and the height of its summit level at 600 feet above sea-level would make its adequate enlargement very costly, and consequently it is unlikely that the scheme will be carried out. The Caledonian Canal, executed in the early part of the present century along a naturally favorable route, owing to the existence of a chain of lakes, was designed on a larger scale, with an available depth of 17 feet.



This canal, however, is no longer adequate for sea-going merchant vessels, and still less for the passage of vessels of war, as originally contemplated; but this route never attracted much traffic, and the advent of railways, the adoption of steam for navigation, and the increased draught of vessels have aided in keeping away trade.

Recent inter-oceanic canal undertakings have aimed at a far more general accommodation of traffic, and have been designed to shorten the main routes of the traffic of the world between far distant ports. The vicissitudes through which *the Suez Canal* passed, and its ultimate great commercial success, are well known. The work presented no serious engineering difficulties, the greatest depth of cutting being only 80 feet, and the prospects of the silting up of Port Said Harbor having been greatly overrated. The real difficulties consisted in raising adequate funds for the execution of the work; but these were overcome by French energy, the cordial support of the Egyptian rulers, and their aid with forced labor and money. This canal has entirely altered the sea route between Europe and the East, and to some extent the Australian traffic; and the trade through it has been so great that traffic by night has had to be organized by the aid of the electric light; whilst more perfect accommodation for the shipping will eventually be secured by the widening works in progress. Great Britain has derived great benefits from the canal by the shortening of the voyages to India and her colonies, and the shareholders are receiving ample dividends. Egypt has already derived considerable advantages and increased importance from being on the highway to the East; but the full value of the Suez Canal to that country will not be fully realized till, on the termination of the concession shortly after the middle of the next century, its government will have the possession of this splendid inheritance.

*The piercing of the isthmus of Panama* by a navigable channel would probably confer almost equal advantages on the commerce of the world as the Suez Canal. Unfortunately, the conditions of the work are less favorable. The length of cutting is, indeed, considerably shorter, both at



Panama and Nicaragua; but a tide-level canal at Panama would have involved a depth of cutting reaching a maximum of 344 feet, mainly in slippery clay, and the proposed Nicaragua Canal would necessitate a cutting 328 feet deep about 20 miles from Greytown. The climate of the isthmus is unhealthy; the region is subject to occasional earthquakes; and the abundant tropical rains are liable to produce considerably greater inconveniences than the dryness of Egypt. In spite, however, of these disadvantages, the uniting of the Atlantic and Pacific Oceans cannot be regarded as beyond the limits of engineering skill. No financial aid can be expected from the governments of the countries through which the proposed canals would pass; and the financial difficulties of the problem have been exemplified in a vivid manner by the collapse of the Panama Canal Company. A private company experiences almost inseparable obstacles in raising capital for such a gigantic work; and a certain amount of the capital having been raised at the hopeful commencement of the enterprise, and the works partially carried out, the company, in seeking the additional capital necessary to complete the undertaking, and to give any return to the capital first subscribed, falls into the clutches of rapacious financiers, who can impose exorbitant terms on a company at the end of its resources. The peculiar features of such a work are the immense capital required, the uselessness of the canal till its final completion, and the uncertainty as to the actual cost of the enterprise. The Manchester Ship-canal had to be aided by financiers to start it; and the works would unquestionably have been brought to a standstill, except for the timely aid of the Manchester Corporation, though the capital involved is considerably less than any Panama scheme would require. The regulation of the Danube, and the deepening of its outlet, have been effected by a European commission, composed of representatives of the nations interested in the navigation of that river; but this was the result of a special clause in the international treaty at the close of the Crimean War, and the nations interested were clearly defined. It would be more difficult to form a combination of the nations inter-



ested in the cutting of a navigable channel through the isthmus of Panama for the purpose of raising the capital and constructing the works; but some national guarantee appears essential for obtaining the necessary funds at a reasonable rate and insuring the completion of the work. Probably the most feasible plan would be for the United States government to undertake the work, as it would be the nation that would reap the main indirect benefits of the canal, by thus connecting its eastern and western coasts, and thereby promoting the commercial prosperity of the nation. This course would obviate any international complications, and would give the United States that commanding control of the canal which, in a waterway so close to their territory, and of so much importance to the nation, they naturally desire. Till the stoppage of the Panama Canal works, it might have been unwise of any government to promote a rival scheme; and the construction of two waterways would have been injurious to the success of both. Now, however, when there is no prospect of a revival of the Panama Company, and the French government has declined to intervene, the work of joining the two oceans is again open to the world.

There appear to be three practical solutions of the problem; namely, the completion of the Panama Canal, the construction of the Nicaragua Canal, and the formation of the Tehuantepec Ship-railway. The original scheme of the Panama undertaking as a level canal might have proved an impracticable work, owing to the depth of cutting in a treacherous soil under tropical rains, combined with the unhealthiness of the climate and the floods of the river Chagres. The introduction, however, of locks would greatly reduce the excavation, and render the work much more feasible; whilst the waters of the Chagres might be utilized in supplying water for lockage. The route possesses the advantage of being only 46 miles long. Portions of the work have been executed, especially at the two ends; and no difficulties seem to have arisen about harbor accommodation at the entrances. The work, however, has not as yet passed out of the hands of the French company. The



undertaking has been so unfortunate that its revival would not readily be contemplated, and it might seem invidious for the government of another nation to assume control of the work. These objections, combined with the uncertainty as to the cost of the purchase of the undertaking, and the natural preference for an original scheme, weigh strongly against the taking up of the Panama works by another nation, unless, after full consideration, it should prove decidedly the most economical method of piercing the isthmus.

The preference shown by Americans for the *Nicaragua route* has doubtless partly arisen from a desire to see the junction of the two oceans effected by their own nation, and their objection to a European nation obtaining control of an American waterway in the neighborhood of their country and of great importance to their trade. Assuming, however, that the cost of the Panama and Nicaragua routes were similar, the Nicaragua Canal would be decidedly the better for the United States, on account of its being nearer to their coasts. As far as small longitudinal sections permit a comparison, the excavations for the Panama Canal with locks and for the Nicaragua Canal do not appear very dissimilar. The Nicaragua route is nearly 170 miles long, or more than three and a half times the length of the Panama route; but this is compensated for by the large proportion of lake and river navigation, leaving only 27 miles of actual canal. The climate, moreover, is said to be more healthy and the rains less heavy than at Panama. An objection formerly raised against the scheme was the prospect of silting up of a harbor at Greytown on the Atlantic; but similar fears were expressed about the harbor at Port Said, which has been easily maintained; and the great improvements in dredging appliances have much increased the facilities for overcoming such obstacles. Accordingly, the balance of advantages appears to be in favor of the Nicaragua Canal, which is more conveniently situated for the United States.

*The Tehuantepec scheme* aims at solving the problem in a somewhat novel manner, which is still under trial. It was, however, proposed by the late Mr. James Eads, and



therefore was doubtless satisfactorily designed. The site, being to the north of the Nicaragua route, is still better situated in respect of the United States ; and the cost of an overland road should be considerably less than the expense of canal excavation. On the other hand, the risk of damage to the vessels is considerably greater on a ship-railway ; and the cost of dragging the vessels across the isthmus would devolve on the company, instead of the vessels being propelled by their own engines. There would therefore be a much greater liability incurred, and considerably greater expenses involved in the working of a ship-railway than in the case of a ship-canal ; for the company would be responsible for the safety of the vessel from the time it is taken out of the one ocean till it is deposited in the other, as well as for its transit across the isthmus. The absence of experience in such undertakings, on a large scale, and the uncertainty as to possible risks in working, render the simpler, though possibly more costly, expedient of a ship-canal the most reliable method of traversing the isthmus.

*Conclusions.*—The value of waterways for traffic in bulky goods, especially in the interior of vast continents, has been fully established ; and the care of the main waterways should devolve on the State, which alone can undertake a comprehensive scheme, and which alone reaps the indirect benefits of the increase in the trade of the country. Only the main lines of inland navigation should be improved at the public expense, local improvements and the establishment of quays and depots for merchandise being left to private enterprise. Works for connecting river navigations or for extending them further into the interior and the development of main lines of inland navigation are specially incumbent upon the State, as constituting national benefits.

The formation of new outlets for ocean traffic may be expedient when the ancient outlets have become inadequate in depths, and when there is a danger of diversion of trade to other countries by the absence of adequate access between commercial centres and the ocean.

Canals for shortening sea routes by piercing narrow necks of land do not come within the province of national under-



takings, except under special conditions, as they are rather serviceable to special ports, possibly of different countries, rather than general benefits to a particular nation ; and they may sometimes confer no advantages on the country through which the works pass.

Inter-oceanic ship-canals traversing isthmuses and transferring the routes of commerce of the world confer great benefits on mankind. The Suez Canal, moreover, has demonstrated that they may under favorable conditions afford an ample return on the expenditure. The capital, however, required is so large and so difficult for a private company to raise on reasonable terms that it appears essential for the success of such an enterprise that either the government of the country through which the work passes should come to its aid, as Egypt did in the case of the Suez Canal, or that the country most interested in the undertaking should carry out the work. The construction of the Nicaragua Canal by the United States government, by its facilities for raising the necessary funds or by means of its surplus, would insure the completion of a work of great importance to America, as well as secure its control over the canal. Moreover, besides the indirect benefits that would accrue to the United States from the development of commerce, such an undertaking offers good prospects of adequate financial success, by serving as an important route for the trade of the world.

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