PHYSICAL PLANNING
IN CONNECTION WITH
LAND RECLAMATION AND IMPROVEMENT
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PHYSICAL PLANNING
IN CONNECTION WITH
LAND RECLAMATION AND IMPROVEMENT

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FOREWORD

The constant growth in world population makes it ever more needful to provide new agricultural land, and also necessitates making a more intensive use of land already under cultivation.

In the sphere of land cultivation and improvement it is becoming increasingly evident what an extensive field of operations there lies before us, and consequently it would be very valuable if the knowledge and experience gained by certain countries could be made available to others.

It was this idea that led, in 1956, to the founding of the International Institute for Land Reclamation and Improvement. Its establishment was made possible by the initial financial support of the W. K. Kellogg Foundation, Battle Creek (U.S.A.).

The fact that Holland was chosen as the country in which to establish the Institute is due to the great experience gained in this low-lying and densely populated country in executing land reclamation and improvement projects, both as regards the technical and agricultural aspects and the social and economic ones.

One method by which the Institute intends to spread knowledge and experience is by the publication of various articles, and it is proposed to issue a series of publications dealing with different subjects. We have in mind both papers compiled by specialists working at the Institute, and articles which have already been published elsewhere but are considered to be of such wide significance as to warrant their distribution in other parts of the world by means of translation or re-editing.

It affords me great pleasure to introduce the present publication, the first of the series, in this instance dealing with the physical planning of areas to be reclaimed or improved.

The Board of the International Institute for Land Reclamation and Improvement express the hope that the contents of this and subsequent articles may prove useful to whoever peruses them.

The Chairman of the Board of Management of the International Institute for Land Reclamation and Improvement

A. W. van de Plasse

Director-General of Agriculture, Netherlands Ministry of Agriculture, Fisheries and Food
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1. INTRODUCTION

The designing and execution of land reclamation and improvement projects involves a wide variety of operations. Although many of these are closely related and it is not always possible to draw a sharp line between them, in general they may nevertheless be classified into three main groups, viz. civil engineering works, agricultural works, and social organisation.

Civil engineering works include, for example, the laying of dykes and roads, the excavation of canals, the construction of dams, bridges, water-distributing works, locks, pumping stations, and so on. Agricultural operations chiefly consist in making the soil suitable or more suitable for agricultural use, and consequently comprise the preparation or re-preparation of fallow land for production, parcelization, organisation of the agricultural water management etc., as well as the preliminary tillage of newly-won cultivable land until such a date as it can be taken over by the farmer-colonists.

Finally, we may include under social organisation all such activities as are directed to the creation of conditions under which the individual and communal life of the present or future inhabitants of the area concerned will develop as favourably as possible.

Sufficient attention has not always been paid to each of the three said groups of activities in the past, and unfortunately this still applies to large areas at the present day. Social organisation in particular is a task which is still often neglected. This in itself is easy to understand, as even in countries in which much attention is paid to this work the idea of it being necessary is only of very recent date, and the application of social science and physical planning to the preparation of land reclamation and improvement projects is still in the development stage.

In view of the half-hearted fashion in which problems relating to the social organisation of reclaimed or improved areas are still often dealt with, an article specially devoted to this subject would appear to be desirable, especially as since the last war in particular the need for and interest in the execution of land reclamation or improvement projects has greatly increased in many countries. There is no doubt that the development of
international technical aid, whether or not under the auspices of the United Nations, has been a powerful stimulant in this respect. If, therefore, it may be considered a useful thing to compile an article in which attention is specially drawn to the importance of social organisation as a part of land reclamation or improvement works, the question at once arises as to what such a publication should and can include. In fact, social organisation in newly reclaimed or improved areas will be based on different standards in different parts of the world, varying according to the geographical and climatic conditions, the economic, social and political structure, the cultural pattern etc. It must consequently be regarded as an impossibility to compile a kind of handbook from which one can learn straight away what steps should be taken in the case of each individual project in order to arrive at the best possible social organisation. The encyclopedic knowledge of local conditions which this would require, conditions which are moreover subject to continual change, is in practice unattainable. Within the limits of a summary article there are, however, two things we can aim at, namely:

1. we can try to demonstrate that in undertaking land reclamation or improvement works it is essential to devote full attention at all times and in good time to the problems related to the social organisation of the area.

2. it is possible to review the various factors that are important in such social organisation, and each of these factors can then be discussed in greater detail.

These are the two aims of the present article in which consideration is only given to a certain section of social organisation, namely physical planning (see page 14). It was decided that in order to avoid constantly discussing the problems concerned in vague general terms the object envisaged could best be achieved by dealing with them with reference to concrete examples.

It should not occasion any surprise that the great majority of these examples are drawn from the procedure in land reclamation and improvement works in Holland, both because the writer, himself a Dutchman, is of course more informed on this subject, and because of a more objective argument, namely that as a result of developments in this country which thanks to its geographical situation has already been engaged for centuries on land reclamation and cultivation, much attention is being devoted at present to social organisation both in the vast reclamation projects in the former Zuider Zee and elsewhere, and in land improvement projects. Holland has gained a great deal of experience in this type of work and also has the advantage that thanks to its high standard of science and education it has available the services of a great number of scientifically trained experts of various kinds. The lead given by the State in land reclamation and improvement works has made it possible to bring together these experts in special government departments created for the purpose of preparing and executing the projects. With only the welfare of the entire community at heart, these departments can devote all their
energies to their task of carrying out land reclamation and improvement projects in a proper scientific manner from the technological, economic and social point of view.

It is quite easy to understand why the problems of social organisation have only received a great deal of attention very recently. They have, in fact, a close connection with the development of the "new" social sciences, and these in turn are related to the rapid growth of the population. A high density of population makes it necessary on the one hand to analyse the resources and to examine the conditions governing their extension, and on the other to utilize the limited amount of land available in a manner which is socially, economically, technologically and esthetically justified. Population problems have led to population research.1)

The rapid growth of population and high density of population also explain to a great extent the increasing need for land reclamation and improvement. During the present it will not very often happen any more that the creation of new resources for a large number of farmers and the increase of agricultural production are not the main objects of land reclamation projects. This has not always been the case in every country. To illustrate this it may be useful to give a very brief outline of the history of the purpose for which land reclamation work has been undertaken in the Netherlands. Here even centuries ago bays were confined by dykes and lakes were drained with the chief object of protecting the adjacent land. In Holland in particular these waters constituted a continual danger by overflowing their banks in stormy weather and flooding wide areas. Even at this date, of course, the object of such drainage was also to acquire new land suitable for agriculture, but almost entirely for reasons of private gain and not, as is the case today, in order to create a new means of subsistence for large numbers of cultivators. Thus in the 17th century it was private contractors, mostly rich Amsterdam merchants, who applied to the national authority for concessions to carry out drainage works. They regarded the financing of such works as a good investment for their capital. Moreover the government, in accordance with contemporary policy, held itself strictly aloof from undertaking works of this kind.

Protection against floods was still the actual object of the drainage of the 18,000 hectares (45,000 acres) of the Haarlemmermeer about the middle of the 19th century, and it was still an important consideration in 1918 when the law was passed relating to the enclosure and partial reclamation of the Zuider Zee. It is no mere chance that the proposal was accepted by the national assembly so soon after the storm tide of 1916 when large areas bordering this shallow inland sea were flooded. But on this occasion it was mainly other reasons that finally resulted in this important decision being made—reasons connected with the great increase of population in Holland since the end of the 19th century. During the first world war when Holland, although not involved in the hostilities, was largely cut off from overseas supplies, it had become clear how greatly dependent the country was on such supplies in order to feed its population. It was thought that the

1) Dr. Sj. Groenman (Professor of Sociological Methods), Kolonisatie op nieuw land, 1953, p. 9 (Assen, Van Gorcum en Comp. N.V.)
food position would be greatly improved by adding to Dutch territory and wresting from the sea by peaceful means 220,000 hectares (550,000 acres) of excellent cultivable land. Moreover the execution of these works, which it would take many years to complete, were regarded as an excellent remedy against unemployment and social unrest. And finally, the important argument was now adduced that the new land would afford a livelihood to many farmers for whom there were no further opportunities on the old land. The importance of this objective increased as the drainage work proceeded and at the same time the population of Holland continued to increase at a great rate. As a result of simultaneous developments in social sciences, a factor referred to above, it was realised to an increasing extent that in order to derive the maximum profit from the newly-won area care should be taken to organise it in such a way that all the conditions would be present for the vigorous development of the economic, social and cultural life in the new land. The pitiful conditions which had prevailed in the previous century during the first years of the Haarlemmermeer¹) were also held up as an awful example. It was in this way that interest in social organisation in land reclamation work made its first gradual appearance in Holland.

Either for geographical, technical, financial or economic reasons, land reclamation will often only be possible to a limited extent. This was also the case in Holland. But the population continued to grow. It was quickly realised that land reclamation would only provide a limited solution of the problem of land hunger among the younger members of the agrarian community and of maintaining a reasonable level of prosperity for the agrarian section of the population, especially as the great increase in population meant that more and more valuable cultivable land was being lost to urban extensions, the laying of roads, railways, airfields, factory sites, and so on. Attempts had to be made to overcome the increasing difficulties by various means. There was practically no further wasteland for development so that a solution had to be found in industrialisation, emigration and increasing the level of agriculture in the old land. Thus it came about that in Holland the great increase in the population led to a vigorous and many-sided development in the agricultural sphere as well.

Improvement of farm management was one of the means that could be adopted in an attempt to increase the standard of living on the smallholdings in particular, thereby increasing at the same time the means of subsistence on such holdings. A well-organised agricultural extension service, based on scientific research, has made an important contribution in this direction. But it was also realised that there were various matters such as parcelization, accessibility and water management in a wider sense, belonging to the external production factors²) which the individual farmers would hardly be able to improve themselves. This led to the carrying out of re-allocation schemes in fairly extensive blocks of farms, first of all on an entirely voluntary basis. The first statutory regulation concerning reallocation came into force in 1924. In the beginning it had only a slight effect, but after the amendment to the Reallocation Act in 1938 there was a great increase

¹) Dr. H. N. Ter Veen† (Professor of Social Geography), De Haarlemmermeer als kolonisatiegebied, 1925; Groningen, P. Noordhoff & Zn.
²) Cf. S. Herweijer (Director Government Service for Land and Water Use); Cultuurtechniek als middel tot welvaartsverhoging van gebieden met een vertraagde ontwikkeling; Landbouwkundig Tijdschrift
in the volume of land improvement work, particularly after the second world war. As a result of the new concepts regarding the duties of the State which was regarded as being responsible for the material and spiritual welfare of its citizens as well as their safety, land improvement works and measures in Holland, as in the case of land reclamation, were not confined to the technical aspects, but began to cover the whole field of social conditions in the areas concerned. The new Land Consolidation Act of 1954 may be regarded as the outcome of this evolution in ideas regarding the institution of land reallocation. Hence nowadays attention is paid both to the said external production factors and other factors which the individual farmer has little power to alter, as for instance, the land tenure system, employment, farm-size, the provision of public utilities (watermains, electricity, telephone) and also to a number of factors lying particularly in the social and mental sphere, such as the character of the inhabitants, the effect of instruction and education, class and social organisation, religious and mental life, customs relating to heritable leasehold and division of estate, place of residence and dwelling.\(^1\)

The above remarks may suffice to show how in Holland, under the pressure of the special demographic and economic conditions, land reclamation and improvement projects have evolved from purely technical works into comprehensive “regional development projects” in which “social organisation” occupies a very important place and is nowadays even generally regarded as being an integral part of such works.

It should not, however, be concluded from this that the need for social organisation only exists in countries such as Holland which are confronted with the problems of a large and constantly increasing population. In fact in whatever part of the world and under whatever conditions land reclamation and improvement projects are undertaken, the areas concerned will always be settled sooner or later, so that it will always be worthwhile to give prompt and adequate attention to the problem as to what measures are required to ensure that the settlers live and work under the best possible conditions in these areas. It is only that in Holland the development of land reclamation and improvement activities in this direction has been greatly promoted by the serious demographic problems.

Before entering into the question as to what is entailed in this work of social organisation it may be advisable to subject this term to a more detailed analysis. Groenman\(^2\) points out that social organisation amounts to influencing the formative forces of group-life. He distinguishes three such formative forces, viz.:
1. the physical environment
2. the physical and psychological characteristics of the inhabitants, and
3. the spiritual and material possessions of the group (its culture).

He also points out\(^3\) that if we accept this distinction the influencing of the formative elements can be logically separated into the following elements:
1. physical planning
2. colonisation policy
3. cultural policy

\(^1\) Herweijer, op. cit., p. 419. \(^2\) Groenman, op. cit., p. 20.
\(^3\) Groenman, op. cit., p. 52.
which refer respectively to the geographical environment, the composition of the initial population and the group's material and intellectual possessions. It is these three elements which it will be necessary to discuss in greater detail. On practical grounds it was decided to limit the present article to the first of these three elements, viz. physical planning. It may then be possible to deal with the other two elements in a subsequent article. It should, however, be observed that there is often a close connection between the individual elements. This may be illustrated by the example given by Groenman, viz. the school system.1) On this subject he says: "The creation of an opportunity to pursue specific types of education is an act of cultural policy which is, however, accompanied by physical planning activities, as classroom space must be set aside for the mental content of education, and moreover the attracting of teaching staff belongs to the sphere of colonisation policy."

A discussion of the elements of social organisation naturally begins with physical planning because in the very first stage of drafting projects full emphasis should be placed on the physical layout. In fact the layout of an area is more or less fixed for a long period, if not permanently, so that any errors made may cause serious harm or inconvenience to many generations of the population.

After the terms employed in 2. have been defined, it is explained in 3. in what respects physical planning work in connection with land reclamation differs from that in connection with land improvement. 4. summarises and discusses in greater detail the various facets of a plan for organising new land to be brought into cultivation or areas to be improved, being mainly based on the preliminary work on the plan for laying out the Zuider Zee polders. Lastly in 5. we shall attempt to show from a number of examples drawn from the long and varied history of land reclamation in the Netherlands what serious drawbacks may arise if in laying out new areas or improving old ones insufficient attention is given from the outset to the physical planning.

1) Groenman, op. cit., p. 52.
2. DEFINITIONS

Before embarking on a logical discussion of the meaning of physical planning in land reclamation and improvement projects it is essential to define more exactly the terms employed in this connection. We will begin with "physical planning" which can be described as the activity dealing with the regulation of the designing and the use of the land, thereby taking into account the requirements of science, practice and aesthetics. In order to prevent misunderstanding it is worthwhile pointing out that this regulation of the designing and use of the land does not extend so far that physical planning also has to concern itself with a farmer's crop rotation scheme, for example. From the physical planning standpoint it is of no importance whether rye, oats, potatoes or sugar beet are grown on a given plot of agricultural land. But it may be very important for the further layout of a specific area to know whether the cultivable land in that area is intended for arable farming, livestock breeding, horticulture or forestry.

Four planning facets are generally distinguished, viz. work, settlement, recreation and traffic, although from a sociological point of view the whole of designations to be given is insufficiently covered by the four categories mentioned before1). Nevertheless from the point of view of function this order is logical since the means of subsistence of a population largely determines its size and composition, and consequently the manner in which a given area is settled and the land area required for such settlement. Industry, for example, has a strong tendency to form agglomerations, whereas agriculture often leads to scattered settlement. The manner and density of settlement thereafter determine to a large extent the need for recreation grounds. In populous centres of industry and commerce, for example, the need of woodland and wasteland for recreational purposes is a far more important problem of physical planning than in predominantly agrarian districts. In the last place we should mention traffic. As VAN PAASSEN2) emphatically states, the system of traffic communications has the function of a geographical link between work, settlement and recreation functions, though this does not alter the fact that in the layout the road system forms the basic pattern of the landscape and as such is often of primary importance.

1) Groenman, op. cit., p. 55-56.
2) Chr. van Paassen: Streekplan Walcheren 1951, p. 183. Assen, Van Gorcum & Comp. N.V.
As Groenman puts it, the starting point should invariably be that in principle physical planning extends to every sphere of community life that may find expression in space. From this it follows at once that there is a close connection between physical planning and sociology, especially the research branch of the latter termed sociography. The initial survey, which is usually carried out by specialists in different fields, should serve as the basis of the planning of the area; this planning is in turn the basis on which the space is laid out.

The terms land reclamation and improvement in conjunction are intended to indicate all projects of which the object is to acquire new cultivable land on a fairly extensive scale and to make it suitable for human use and settlement, as well as projects as aim at making existing cultivated land more suitable for this purpose.

In view of the fact that numerous terms are employed for the various branches of this extensive field of work and measures, and these terms sometimes partly overlap, or their connection with each other is not clear, while it may also happen that the same term has several meanings, it is desirable to define somewhat more exactly what is meant by land reclamation and improvement in this paper.

Sometimes the meaning of the term land reclamation is limited to measures for promoting the silting-up of parts of alluvial coasts. In this article, however, we attach a wider meaning to the term and would include under it not only the said reclamation of land by silting-up but also the draining of lakes and swamps and damming and draining of sea inlets and inland lakes on the one hand, and the preparation of fallow land for production on the other, — in fact all activities directed to the winning of new development land. In this connection it should be noted that by “development land” is meant both land for agricultural use and development land in the broadest sense of the term, including land which can be used for industrial, recreational or other purposes.

Under land improvement may be included all work and measures which permanently, or at least for a long period of years, increase the intrinsic value of agricultural land. In his note on this definition Hellinga points out that we speak of the intrinsic value of land, and not of its productive capacity, because activities such as laying roads and increasing the size of holdings are not directly aimed at increasing production but in the first instance at reducing production costs. The result of this is an increase in the intrinsic value. The definition includes both land improvement works and measures, by which is meant, for example, modification of water levels (increasing production) and exchange of lots (increasing intrinsic value). Lastly, the words “permanently, or at least for a long period of years” in the definition serve to distinguish these activities from ploughing, manuring, etc., which belong to the normal work carried out by the farmer every year and do not come under land improvement. Hellinga then goes on to say that in broad outline land improvement in Holland comprises:

1) The definition given by Hellinga (Professor of Land and Water Use) of the term “cultuurtechniek” (land and water use) which has become established in Holland (F. Hellinga, Cultuurtechniek 1954, pp. 6-7; The Hague, Staatsdrukkerij en Uitgeverijbedrijf.)
Definitions

a) regulating the water management (discharge and drainage of water; surface irrigation, sprinkler irrigation and infiltration; prevention of water pollution and salinization).

b) soil improvement (making suitable (again) for production).

c) improvement of the parcelization (exchange of lots, accessibility, reallocation, opening up by laying roads).

d) land reclamation in its various forms and the cultivation of reclaimed land.

If it is desired to make a clear distinction between land reclamation (the winning of new agricultural land) and land improvement (increasing the intrinsic value of existing agricultural land) the group of activities mentioned under d and actually also “making suitable for production” referred to under b should not be included under land improvement. It should be added that the above summary does not really give an adequate picture of the complexity of land improvement work being carried out in Holland. Originally land improvement work consisted of little more than small incidental improvement projects, but it has slowly expanded into a complex scheme of work and measures resulting in the overall improvement of entire districts which sometimes extend over thousands of acres. The old idea of “reallocation” has thus been greatly enlarged and changed to “land consolidation”.

Insofar as land improvement is concerned in modifying the profile structure of the soil, consolidating and improving the shape of holdings, choice of the right size of farm holding and enlarging undersized farms (reform), water control, agrarian accessibility and landscaping, it has a specifically agrarian character; but insofar as it relates to hydraulic works (dams, pumping stations, watercourses), road construction (farm roads, development roads) and building works (construction of farms and agricultural labourers’ dwellings and laying on of electricity, water and telephone connections) land improvement has a civil engineering and building aspect.¹ Thus although land improvement has marked non-agrarian aspects, it may nevertheless be considered characteristic that all land improvement works and measures are directed to making the areas concerned more suitable for the practice of agriculture as a means of subsistence and everything connected therewith.

3. THE DIFFERENCES BETWEEN LAND RECLAMATION PLANNING AND LAND IMPROVEMENT PLANNING

There is a fairly considerable difference between physical planning work relating to entirely new areas obtained by means of land reclamation or opening up of uncultivated land, and that relating to existing land which has long since been in use. Whereas in the latter case the persons concerned in physical planning work have to deal with the population present in the area, forms of land use which have developed historically and are often of a complex nature, with a sometimes very serious conflict of interests between the various categories of land-users, and with bad relationships often almost impossible to alter, in the physical planning of new areas they can concentrate their activities on completely virgin territory in which, generally speaking, everything can be laid out and constructed in the manner considered most desirable from theoretical considerations and individual ideas.

This briefly characterises the great difference between planning work in connection with land reclamation projects, and that associated with land improvement. For a proper understanding of the practical consequences of this it is desirable to investigate rather more fully the specific features of each type of planning work.

3.1. PLANNING WORK IN LAYING OUT NEW AREAS

It will be obvious that drawing up plans for the laying out of an area in which everything has to be laid and constructed from scratch often has a great deal of attraction for the persons engaged on such work. There is no doubt that for many people it is more fascinating to build a new house than to repair or alter an old one!

Nonetheless planning work relating to entirely new areas has its own peculiar drawbacks. Usually there is a complete lack of starting points for making forecasts as to the future development. The social science research worker who when engaged on a preliminary planning survey in old land begins by analysing the existing social and economic structure of the area in question and the development during recent decades, can often draw from this conclusions as to the development to be anticipated in the future. When, however, it
Differences between land reclamation and land improvement planning

is a question of laying out entirely new areas the work has to be carried out in the complete absence of any such indication. In this case it will be necessary to try to obtain beforehand the best possible idea of the future community life in the new area and to consider what kind of physical planning of the new land is required, so that as a working and residential area of the future community it will enable the latter to develop both properly and prosperously. Vice versa, the ultimate choice made as regards the lay-out and settlement of the new area will obviously have a great influence on the ability of the future community to develop itself.

It will be clear that as regards laying out a new area the responsibility lying on those entrusted with drawing up the necessary plan is to this extent greater than of those engaged on similar work in existing land, since in the latter case the inhabitants concerned can always be called upon to assist in drafting plans, or at any rate afforded an opportunity to express their opinion on the plans already drafted. It is therefore advisable for the preparation and execution of the lay-out of new areas to be done on the responsibility of a body authorised to look after the common interest. It is hardly necessary to add that it is certainly not even the case that in such a new area society can be moulded in any manner desired; in fact it is not until the area has been laid out and populated in the first instance that the desires and forces of the population itself will make themselves felt and possibly lead to unforeseen new developments in the future. Outside forces may also cause considerable changes. We may instance the possibility of new technical inventions which could have a great effect on traffic and transport. Society is essentially a dynamic whole liable to change at any time according to circumstances. Hence a plan should never be a rigid one, but always allow itself to be adapted to changed social conditions.

It was noticed above that in planning new areas acquired by reclamation one has to deal with still entirely virgin land in which, generally speaking, everything can still be laid out or constructed in a manner considered most desirable from theoretical considerations and individual ideas prevailing at the time. Nevertheless it is not true to say that any course chosen by the planner is open to him, – he very soon discovers in practice that this is not so. From the outset the freedom of choice is limited by various specific factors; in fact the situation, shape and size of the new area will first of all be mainly determined by natural and technical factors. This situation, together with the natural geographical conditions of climate, relief and character of the soil, determine in turn, within the limit of the technical and financial potentialities, the water management programme for the new area and, again in conjunction with the latter, the possibilities of agrarian land use which in newly reclaimed areas will in most cases be the chief form of land use. Again, the form or forms of agrarian land use eventually chosen within the framework of these technical possibilities are mainly determined by economic, social, and possibly also political factors.

A circumstance which is also of especial importance for the physical layout is the situation in the adjacent areas. A newly reclaimed area will usually be wholly or partly bounded by
land already in existence which has been brought under cultivation. Consequently in planning the transport system and the new settlements in the reclaimed land the object will be in most cases to join the new land as well as possible to the adjacent old land and to make the new area fit harmoniously into the whole so as to form an integrated part thereof. Moreover there is no doubt that the agrarian structure in the existing land (type and size of farm, numbers employed, etc.) will often be a pointer to the direction to be taken in determining the agrarian use of the new area, although this does not of course mean that one should be forever debarred from doing something different from what was done in the old land.

Thus whereas on the one hand the freedom of choice in drafting a development plan for new land is already hampered by numerous factors, on the other hand the consideration which has to be given to the various planning interests is often the reason why, when seeking a compromise, one is, so to speak, driven to accept a specific solution for which it is ultimately only found possible to substitute variant solutions to a limited degree, at least (and this point deserves to be emphasised) provided all these planning interests are, in fact, taken into account as far as possible.

3.2. PLANNING WORK IN THE IMPROVEMENT OF EXISTING AREAS

As already observed, the main feature of planning work in land improvement is that in this case one has to deal with an area which has been divided up spatially, viz. an area of which practically every square foot is already assigned to a specific use, has a specific owner and a specific user, and where in many places the land has been used in such a way that it is either very difficult or impossible to effect any change. It is only in very special and urgent cases that it will still be possible to demolish existing settlements or buildings and rebuild them elsewhere, to fill up existing canals or to remove roads. Although this may be occasionally necessary in incidental cases, there is no question of it being possible to apply such a scorched earth policy to an entire area so as to subsequently reorganise it entirely according to plan. Hence in improvement projects planning work will always necessarily be more or less of the nature of patchwork; the main pattern on which the area is divided up must be taken for granted. It is precisely this that makes the work so exceptionally difficult to carry out. In fact, it is fairly certain that each incidental improvement has an effect on other intended uses of the land. Thus, for example, the laying of a new road required for opening up a certain part of the area will cross the land belonging to land users at other points and thus adversely affect the manner in which the land is parcelled out on these farms. The result is that another solution has to be sought, e.g. by exchanging fields with other land users, and this in turn may lead to a further revision of the manner in which the fields are divided. It may also happen that the laying of a road causes a change in the water management in certain soils and that this also entails making the necessary provisions. Thus every incidental step taken will usually have repercussions elsewhere so that it becomes necessary to undertake a complete
Fig. 1. AN EXAMPLE OF MODERN LAND CONSOLIDATION ON THE OLD LAND IN HOLLAND
(The Velserbroek reallocation)

Source: Government Service for Land and Water Use, Utrecht
Fig. 2. PART OF THE NORTH-EASTPOLDER WITH MODERN, RATIONAL PARCELIZATION

EXPLANATION:
- Canal
- Secondary canal
- Boundary ditch
- Main road
- Polder road

Source: Board of the Zuider Zee Works - The Hague
Differences between land reclamation and land improvement planning

revision of a fairly extensive area with distinct geographical boundaries if it is desired to effect a truly radical improvement in the state of cultivation. This then, as was outlined earlier in the Introduction, is the direction in which land reallocation has developed in the Netherlands, to become a complicated system of works and provisions in all spheres up to a complete improvement of a district. Moreover it was realised that if all the improvements made are to have the best possible effect the population should be made familiar with the novelties introduced and convinced of their usefulness and necessity. For this purpose a well-organised expert information service, dealing with agricultural, as well as economic, social and intellectual questions, is a sine qua non. The drawing in Fig. 1, which depicts a land consolidation project in the Netherlands chosen at random, shows quite clearly that such an improvement plan comprises far more than a mere “exchange of plots”. The entire field lay-out of the area has undergone a considerable improvement, new access roads have been constructed, and so on. Unfortunately it is not in the power of a drawing to show the improvements made at the same time by means of other activities such as increasing the size of farm holdings, laying electricity, telephone, water mains, etc., improving the conditions of tenancy, providing more employment, improving educational facilities, and so on. A comparison with Fig. 2 which shows a part of the lay-out of the North-East Polder, drawn on the same scale as Fig. 1, clearly illustrates, however, the circumstance outlined above, namely that in drawing up an improvement project one is still very much tied down by everything already in existence in the old land. It will never be possible to draft the same type of completely rational parcelization plan as in a newly reclaimed area.

Finally, another circumstance should be noted which makes so much more difficult to carry out physical planning work in connection with land improvement than in new areas. Owing to the fact that the land is already completely occupied in existing cultivated areas one will often come up against a complicated ownership and tenancy system, so that practically any change such as the compulsory acquisition of land for the purpose of providing public services, exchange of plots, consolidation, etc., may give rise to troublesome and time-consuming litigation. A good land improvement or land consolidation legislation in which generally valid rules are given on the various questions at issue and the rights and duties of landowners and/or land-users are clearly defined would do much to simplify these problems.
4. THE ELEMENTS OF PHYSICAL PLANNING IN LAND RECLAMATION AND IMPROVEMENT

It was explained in the previous paragraph that there are great differences between planning work in land reclamation and in land improvement as regards conditions with which planners are confronted. Reference was also made to the specific difficulties occurring in each of the two cases.

The fact that great differences exist in these respects does not mean that there is also a difference in the complex of planning facets that have to be taken into consideration in such work. It is the same in principle for both types of projects, so that in the present paragraph there is no need to distinguish between land reclamation and land improvement in discussing these aspects.

The interplay of planning aspects is, however, most readily seen when drawing up a plan for laying out a new area. Consequently in what follows these aspects will be chiefly discussed against the background of the work that is being carried out in drawing up the plans for the largest and most modern land reclamation project in Holland, namely that of the enclosure and partial reclamation of the Zuider Zee.

Moreover, owing to the fact that the State itself has undertaken the drainage and cultivation and is also the owner of the newly won land, it is possible to carry out physical planning in the Zuider Zee polders in a particularly systematic way.

In this connection it should therefore be emphasised beforehand that the arguments adduced in favour of a specific solution and the standards applied are frequently based on the specific conditions which apply to this Dutch project, and hence cannot be considered as applicable without modification to projects undertaken in other parts of the world. Thus, for instance, it should be remembered that in discussing parcelization the requirements that have to be met in an area needing irrigation will differ from those in the polder landscape of Holland where the main task is to draw off surplus water. To take another example, one of the main functions of the village in the Zuider Zee polders is that of service centre for the surrounding country district in respect of the daily needs of the inhabitants scattered over this area and who enjoy a relatively high standard of living. In
other parts of the world a village will undoubtedly have to fulfil other requirements in this respect, as for instance in North America where the mail-order system is very highly developed. In Asiatic and African countries where the inhabitants have a standard of needs entirely different from what applies in Western Europe, the function of the village will obviously be different again.

If after these introductory remarks we now start to discuss the planning aspects, we will first briefly refer to an observation made in paragraph 3, namely that newly-won areas will in most cases be intended for agrarian use. Starting from this assumption, the various interests that have to be taken into account in drawing up a plan may be divided into the following groups:

a. the main elements of water management (lines of the canals and other main watercourses for irrigation and/or drainage).

b. parcelization (shape, dimensions and arrangement of the plots of land intended for agrarian use) and farm-size.

c. settlement (system of settlement of the agrarian and other connected population groups, as well as the provisions relating to such settlement).

d. transport (measures for the provision of water, road and possibly rail or air communications).

e. landscaping and recreation (woods, green belts, planting trees and shrubs in farm gardens, sports fields, etc.).

f. administrative division.

This summary alone shows how many different kinds of specialists are required for drawing up a planning programme. Water management is a subject of study of civil engineers and agriculturists (land and water use experts), parcelization and farm size are mainly agricultural problems of a technical and economic kind, the most desirable manner of settlement is studied by social scientists, the administrative division belongs to legislative science and sociography, while the solution of the transport problems and those of landscaping are in the hands of transport and landscaping experts respectively.

This brief list in which only the visible elements of the plan are referred to still fails to describe completely which branches of science are essential to the preparation of the plan. Soil survey, for example, is vastly important and constitutes one of the main foundations of the plan. It provides the necessary information regarding the suitability of the area in question for exercising the various forms of agriculture, on the best way to tackle the opening up, on the conditions governing proper water utilisation, and so on. Consequently much attention is being paid to soil and land classification in the reclamation works in the Zuider Zee area. 1

A soil survey atlas 2 based on minute investigation has been compiled on behalf of the work of creating Eastern Flevoland, the third Zuider Zee polder now under construction. Not only was a great part of the development plan for this polder based on this atlas, but

1) A publication specially devoted to this subject will shortly appear in the series published by the International Institute for Land Reclamation and Improvement.

2) Oostelijk Flevoland, atlas ten behoeve van ontginning en bestemming. - Published by the Wieringermeer Directorate (North-East Polder Works), Zwolle, 1953.
it also clearly shows where pedological and topographical factors are absolutely decisive as regards land use, and where owing to the greater possibilities afforded by the soil it is possible to make a choice from several alternatives in laying out the area. Hence there is undoubtedly a very close connection between physical planning work and soil and land classification work undertaken beforehand.
Since so many specialists working in different fields are required for drawing up a planning programme, the first requirement to be made of these experts is that they should be very willing to co-operate and always be alive to the interests represented by the others. The drawing up of a plan of this kind is a typical example of teamwork.
The planner's part in this team is in the first place that of a co-ordinator. Although he obviously cannot be required or expected to be equally expert in all fields concerned, he will nevertheless have to be able to survey the whole subject and be capable of working up into a harmonious whole, in the form of a general planning programme, the requirements relating to the various aspects. Where the different interests threaten to clash he will have to act as a mediator in weighing up these interests or otherwise try to arrive at a compromise.
In most cases the physical planner's greatest direct influence will be in marking out the traffic communications, designing the landscape and recreational facilities, and designing the location and layout of the centres of population, in consultation, of course, with traffic and landscaping experts, sociographers and architects respectively wherever possible.
It should hardly be mentioned that before a preliminary design thus drawn up for the general planning programme is ready to be put into practice it will often be subjected later on to numerous modifications on the basis of fresh information or views that have become available, and after having been perused by many of the said specialists or other interested parties.

In the following some remarks will be made on what is entailed in each of the items mentioned before.

4.1. THE MAIN ELEMENTS OF WATER MANAGEMENT
This part of the development plan for a new area is of such a specialist and technical kind and of such prime importance for this development that the "facet-plan" supplied to the physical planner will have to be accepted by him as being mainly unchangeable. In fact, considerations of land improvement and civil engineering, based on the soil survey of the area and a study of the topographical and climatic data, point the way to a solution of water management problems in the various parts of the new land.
The need for surface irrigation in certain parts of the area, for discharging surplus water, the possible need of desalinization, controlling any seepage that may occur locally, and so on, will lead to a system of canals and other watercourses and the necessary engineering works such as pumping stations, locks, and the like. Generally the main discharge lines
will be located in the lowest parts of the area (Thalwegs); the main irrigation lines usually follow the highest possible contours, depending, of course, on the situation in the area with regard to catchment. Moreover a distributing system is required. In designing such a system the technicians in question may well be required to consult those responsible for investigating the most desirable sites for population centres to be established and traffic roads to be built so that in certain cases it may be possible to mark out the supply and drainage canals in such a way that they may serve at the same time as efficient shipping canals for through traffic or for communication with the centres of population. Such consultation is also indispensable for determining the site of bridges or shipping locks (these can often be constructed more cheaply and easily in combination with drainage or supply locks than separately). In some cases it may also be an advantage to lay water-courses and roads next to each other, and this entails consultation regarding the line to be chosen.

4.2. PARCELIZATION AND FARM-SIZE

In laying out new agricultural areas the choice made with regard to shape and dimensions of the lots, and detailed drainage or water-supply, is mainly determined by agricultural and financial factors, with, of course, the water management conditions as the basis. It would take us too far to enter into a discussion here of the merits and demerits of the numerous historical forms of parcelization found in old land since it is obvious that in laying out new areas the object will be to draw up a modern, rational form of parcelling out the land. We need only observe that the parcelization dating from earlier periods which is found in old land is often nothing more than a division of land according to ownership, the shape and dimensions of the plots being determined without any reference at all to the type of soil, water management, type of farm, and so on. For instance, as a result of the system of survey adopted in pioneering days, large areas are to be found in the west of the U.S.A. in which there is a completely uniform subdivision into squares, each square section being one-quarter square mile or 160 acres in extent.\(^1\) The land was granted by numbers entered in registers, this causing great difficulties when the land was divided up at a later date. The square sections were particularly unfavourable in connection with gravity irrigation, so that in the Columbia Basin project begun about 1935 the subdivision into one-quarter square mile sections was abandoned.

In the following we shall only take into consideration the factors which are important in determining rational shapes and sizes of lots. But here again various types are possible; the shape and size of the lot preferred will depend on the type of farm and the form of husbandry that is to be anticipated. Where there is intense mechanical working of the land, as in the furrowing method of surface irrigation and sprinkling irrigation, it has been found that rectangular lots are clearly preferable to those with sides that slant or are otherwise not parallel.

\(^1\) Marion Clawson, Uncle Sam's Acres, p. 46 ff.; New York 1951.
Starting from certain minimum technical requirements, the determination of the dimensions of the lots is also related on the one hand to the cost of laying roads and water courses, and on the other with the cost of running and administering the farms, while the size of farm to be chosen may also have an effect, viz. in the sense that it is of advantage in running a farm if it consists of a single plot, or as few plots as possible. Another important factor is the residence system adopted by the land-users, viz. either in the form of concentrated settlements, or scattered over the rural area, each farmer living on his own farm. From the point of view of running the farm the latter form of residence is generally preferable. It will only be as a result of other urgent circumstances that the land-users of a newly laid-out agricultural area will be exclusively housed in concentrated settlements.

To enable us to demonstrate in greater detail the significance of the financial factors which are important for determining the dimensions of the lots we will therefore now take as starting point a settlement system with a scattered population.

It may be assumed that, again solely from the point of view of farm management, the most desirable shape for a farm would be a square with the farm building in the centre. The farmer will then be living at an equal distance from the four corners of his farm, thus reducing to a minimum the risk that a certain part of the farm would, on account of its remoteness, be less well-cultivated and tended than the parts more nearly situated to the farm building. It will be necessary to stipulate that all farms should be alongside a metalled road, at any rate in the case of areas which must be accessible to modern means of transport. In the case of the "ideal" farm with the farm buildings in the centre the roads will intersect the farms (Fig. 3a) or each building will have to be connected by an approach

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1) For a further discussion of this matter see below, e. pp. 29 ff.
road with the road running along the boundary of the farm (Fig. 3b). In the first case the roads only directly connect the farms situated on the same road, and the other "neighbours" can only be reached via a long detour. In the second case this drawback is admittedly reduced, but there is still the need for a dense and consequently expensive road system. Leaving out of account the crossroads giving further connections, it has been found that as regards the other roads a saving of as much as 50% is obtained when in the case of Fig. 3b the farm buildings are constructed alongside the road instead of in the centre of the farms (Fig. 3c). In this case the cost of any public utilities that may be laid (electricity, water-main, gas, telephone) will also be lower. A further reduction in the cost of road construction is obtained by extending the plots lengthwise and making them narrower at the same time (Fig. 3d). In general this will also mean a considerable saving in the cost of laying watercourses. In fact, in the arrangement of watercourses for the supply or discharge of water in order to avoid the expense of numerous bridgings it will be preferred to make the larger watercourses run parallel to the farm-roads instead of at right-angles thereto. The cost per metre of laying roads and large watercourses will obviously be considerably greater than for laying smaller watercourses (ditches) on the sides of the plot at right-angles to the former. It is clear, therefore, that the total cost of laying out a rectangular plot in which the shorter sides are bordered by the expensive roads and large waterways will be lower than in the case of a square plot of the same area.

In determining the length and breadth of rectangular plots the following factors should also be taken into consideration:

Firstly, a maximum limit will be fixed for the length as owing to reasons of water management the larger watercourses for irrigation and/or drainage will not be designed at too great a distance from each other. Moreover the economies effected in construction costs will not be such as to involve the farmer in disproportionate management costs on account of the excessive length of the plot. From the point of view of general economy the solution to be preferred is obviously the one in which the sum total of construction costs and capitalised management costs is lowest. Within the limits of a technically acceptable length of lot it will thus be possible to calculate these total costs per hectare in an effort to determine the most desirable standard length of lot. The management costs, which will generally be higher as the length of lot increases, comprise higher transport costs on the holding for produce and equipment, and loss of time for men, draught animals, machines, etc. The graph in Fig. 4 shows in diagram form the relationship here referred to. It should however be noted that one is only warranted in making a decision on the length of lot on the basis of the said calculations if it has been ascertained beforehand that such lengths of lots are not also likely to suffer from the drawback of insufficient tending or less rational rotation of crops, and consequently a lower yield per hectare. It is therefore advisable to investigate beforehand what length of holding may be expected to have drawbacks of this kind. The approximate border-line above which these drawbacks occur
length of lots

Fig. 4. Relationship between the length of lots and the sum total of the construction cost and the capitalised management cost per hectare. For a length of lots I the total costs are the minimum.

will naturally depend on the type of farm and the character of the farm management. Thus Bijhouwer\(^1\) finds that in Holland a standard depth of holding has been evolved in the course of centuries which in the case of arable farms is 800 metres (± 2,600 feet), dairy farms probably about a kilometre, fruit farms about 400 metres (± 1,300 feet), and nurseries (vegetables, flowers and fruit in greenhouses, Dutch light houses and frames) only 200–300 metres (± 650–1,000 feet). The same writer noticed that in the province of Quebec in Canada a depth of 800 to 900 metres (± 2,600 to 2,950 feet) was also the normal size in comparatively mixed smallholdings (10 to 20 hectares – 25 to 50 acres), although the farmers were able to add considerably to the size of their farms by clearing the forest at the rear of their land. Where the density of population enabled the farmers to develop their farms freely in width there was, however, a very noticeable tendency to form practically square farms about 400 metres (± 1,300 feet) deep and 300 to 400 metres (± 1,000 to 1,300 feet) wide. Subsequent investigations in Holland have shown that the disadvantages of inferior cultivation of the rear portions of holdings could generally first be observed in the case of lengths of over 1,200 to 1,500 metres (± 4,000 to 5,000 feet).

As regards the desired width of lot, it can be pointed out that this primarily depends on the use of implements. Too small a width is a serious hindrance to the use of implements on highly mechanised farms in particular. On the other hand, the maximum width of lot is again determined by the technical requirements of drainage or irrigation. When tile-drains are used, for example, it is often difficult to maintain them if the lines are too long. In the Dutch land reclamation and improvement projects the maximum tile-drain length is very often 150 to 200 metres (± 500 to 650 feet), this corresponding to maximum parcel widths of 300 to 400 metres (± 1,000 to 1,300 feet). Within the limits prescribed by the technical possibilities, a calculation of the cost of laying and maintenance will probably be a guide to the width of lot to be adopted. In wide lots the drains which slope down to the ditches from a minimum depth in the middle of the land will discharge into these ditches at a lower level than in the case of narrow lots. Consequently the

\(^1\) J. T. P. Bijhouwer (Professor in Landscape Gardening), Kavelmaten hier en elders, Landbouwkundig Tijdschrift, January 1949, p. 19.
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tile-drain trenches and the ditches will have to be dug to a greater depth, so that rather more soil will have to be shifted; but this is set off by the fact that calculated per hectare the amount of soil shifted is less because the total length of ditch is less per unit of area. The amount of land lost is also reduced. In areas in which furrow-irrigation is important the maximum width of lot will often be determined by the applicable length of the furrows.

Naturally it is not possible to make recommendations here regarding specific sizes of lots. The most suitable shapes and sizes of lots for each particular case will have to be investigated separately for each area wherever situated. The above remarks are only intended to draw attention to a number of factors that may be important in determining parcel sizes.

We have seen that it is by no means considerations of physical planning that primarily determine the shape and sizes of the lots, and they have just as little to do with farm-size. The latter depends on many factors such as the type of farm most suitable under the given conditions of soil, climate and water management, as well as social, economic and political factors such as number, size of family, standard of education and financial capacity of the future land-users, the social structure in the district from which they originate, the food situation in the country in question, the supply of labour, the trade outlook, and so on. In general the aim will certainly be to choose a size of farm which under normal conditions and with proper management will afford a decent living to the agricultural families working on it. In short, this amounts to saying that within the framework of the natural and technical possibilities the settlement policy determines the choice of farm type and size. It will therefore be clear that this policy demands a great deal of responsibility.

Directly a plan for laying out a new area arrives at the stage of arranging lots and farms there is an immediate need for physical planning activity based on the sociological requirements. But this brings us to the requirements to be made of the new area with regard to settlement, of which a separate discussion is desirable.

4.3. SETTLEMENT

In practically every case the population of a new area will first of all be agrarian. The composition and settlement structure of the population depend on the settlement policy which is adapted to the conditions obtaining in the country in question. In certain cases there is collective settlement, which is particularly advantageous when the colonists have no experience of agricultural work and no financial resources, as, for example, in the case of the Kibbutzim in Israel\(^1\). This extreme form of collective settlement in which a group of colonists forming a compact unit constitute, as it were, one large family, each member

of which does his share of work and in which even housekeeping and the children's education are a communal responsibility, obviously entails living together in closed settlements, this being moreover necessary for security reasons. Another noteworthy example of more or less collective settlement is the transmigration of Javanese to other Indonesian islands under the auspices of the former Netherlands Indies Government as early as the thirties. The strong ties between the Javanese farmer (tani) and his family and village community (desa) made it possible in many cases to transplant successfully entire family groups or parts of desas from densely populated Java to new areas for cultivation on the other large Sunda islands which were much more thinly populated. In the case of collective agriculture in communist countries the aim is likewise concentrated settlement of the agricultural population. But also in other countries it will be necessary to weigh up very carefully which is the most suitable settlement structure for the future inhabitants of the new area.

There are great variations in the geographical distribution of the usual kind of agricultural settlement. Dovring, who devotes an entire chapter to this question in his excellent book, has compiled a cartogram for Europe on which the average size of village is denoted. This cartogram shows that practically throughout western and northern Europe scattered settlement with small villages predominates; towards the south-east the concentrated settlement structure in large villages is more usual, while in large parts of southern Spain, southern Italy, certain parts of the Balkans and the Caucasus area the so-called agro towns with thousands of inhabitants are actually the normal form of settlement. It may be purely natural factors that have led to such a concentrated settlement, e.g. the sporadic occurrence of springs in arid or semi-arid regions, so that the presence of such a spring was the essential condition for the rise of a settlement, and also historical factors such as the need for security in districts such as the Danube countries where war has been constantly waged throughout the centuries.

In countries where such a system of concentrated settlement of the agrarian population is a traditional feature it will be advisable not to make any abrupt departure from this system when laying out new colonisation areas, despite the fact that there may no longer be any forceful, rational argument in favour of a concentrated settlement and scattered settlement would be greatly preferable from the point of view of farm management. In such a case one should carefully consider whether the colonists' psychical resistance to such a decentralisation might not endanger the success of the colonisation scheme. This does not mean, however, that the transition to scattered settlement cannot succeed. A good example of the latter is to be found in the large land reform complex of Puglia, Lucania and Molise in southern Italy, a district in which the population had traditionally lived in agro towns. Despite the gloomy prophecies on this subject the scattered colonist settlement which had been decided upon has proved to be very satisfactory. Generally speaking, in this area each colonist family lives on its own farm. For the most essential

1) Mr. C. C. J. Maassen, De Javaanse Landbouwcolonisatie in de Buitengewesten; Batavia, 1937.
3) Land Reform in Southern Italy (Puglia, Lucania and Molise); Bari 1955.
public services the inhabitants make use of a number of service centres designed for this purpose, and of which three types may be distinguished:

1) **rural villages** comprising the parish church, school, nursery school, surgery, communal committee, police station, post office, recreation space, inn, shops, together with dwellings for those who provide such services. Each of these centres serves an area of 5,000 to 6,000 hectares (12,500 to 15,000 acres) with an agrarian population of 3,500 to 4,000.

2) **service centres** comprising a chapel, school (perhaps a nursery school), surgery, general store and recreation rooms. These small settlements serve an area of about 1,000 hectares (2,500 acres).

3) **agricultural centres** comprising warehouses, depositories and offices for technical and economic assistance to the new owners.

For supplies of more important commodities and services the inhabitants depend on the small towns, near the new colonisation areas, which are at a distance of about 10 to 20 kilometers (6 to 12 miles) from most persons.

Thus we have a settlement system in which all persons engaged in agriculture are distributed over the country. The smallholdings allocated are family-sized farms, so that the agrarian population consists solely of small independent farmers and their families. The villages and hamlets are only occupied by "service" staff.

It will be clear that intermediate forms are possible between the above extremes of a population entirely concentrated within large or small settlements on the one hand, and the entirely dispersed living units of the agrarian population on the other. An example of this is the reclaimed areas of the former Zuider Zee in the Netherlands. In these Zuider Zee polders farms have been allocated to the colonists in varying classes of size. There are smallholdings on which only the tenant farmer and his family work, and there are also larger farms that can only be cultivated with the help of one or more farm labourers. In order to run his farm in an efficient manner it may be important for the farmer to be able to command ready assistance when necessary. For this reason when building agricultural workers' dwellings on the larger farms (> 20 hectares - 50 acres) the criterion applied was that at least one permanent labourer should live near the farm. The sociographical investigation carried out on these problems of settlement structure also showed that taking into account the individualistic character of the Dutch it was desirable for the labourer's dwelling to be at some distance from the farm, e.g. up to about 200 metres (± 650 feet), and not immediately adjoining. As a result of this the farmer has help ready to hand in case of need, and at the same time both farmer and labourer retain their coveted freedom in family life.

The investigation also led to the discovery that for efficient farm management it was not necessary for other labourers than this first permanent one to live at a short distance from the farm. The other permanent, casual and seasonal workers are therefore all housed in the villages. It is true that as a result they have to travel fairly large distances every day to get to work, but on the other hand their families have the advantage of living close to
the school, church, shops, doctor, clubhouse, and so on. Moreover, and especially in the case of the women, village life is often preferred to residential dispersion in the country because the village is so much more of a social centre. In connection with the said advantages which the agricultural worker’s family derives from living in the village it should be observed that in practice it has been found that in recent years these advantages are being increasingly esteemed. The probable result of this will be that in the Zuider Zee polders still to be made the first permanent labourers will generally be housed in the villages too.

The above considerations show that in any system of settlement, even the complete residential dispersion of the agrarian population, certain focal points of essential undertakings, services and institutions are indispensable. It is impossible to imagine any single advantage that might be derived from a method of developing a new area in which these undertakings, services and institutions were also dispersed, with here a smithy, there a grocer’s shop, elsewhere a post office, a school or recreation room, all far away from anywhere. For a scattered population which is always obliged to travel fairly great distances to reach these essential undertakings or institutions it will be an advantage to be able to settle various items of business in a single visit. A necessary visit to the doctor, for example, will be combined with making purchases in various shops, visiting the hairdresser or post office, and so on. Thus it will always be necessary to concentrate essential services, institutions and undertakings in certain settlements, unless the area concerned is a very small one whose new colonists can have recourse to existing settlements in the adjoining old land for all matters of this kind. Hence the first function of new settlements in colonisation areas will usually be that of service centres from an economic, social and cultural standpoint. Should circumstances require a wholly or partly centralised agrarian population they may also serve as dwelling places for these agricultural workers.

In practically every project of colonisation on new land the question will therefore arise as to the number of settlements required, and their size, location, and layout. There are numerous factors affecting the choice, and these will now be briefly discussed. It should however be observed beforehand that it is extremely necessary for this problem to be studied in good time; it is not sufficient to take the view that all that is necessary is to wait and let the settlements rise in the most suitable sites according to the needs of the persons taking up residence in the new area. It will be shown in §5 to what irretrievable damage such notions can lead.

It is particularly the following questions that will have to be considered in designing a system of service centres:

1) what types of service centres are required having regard to the level of requirements of the inhabitants of the area?

2) what are the permissible distances from these centres for the dispersed population, taking into account the forms of transport available?
3) what requirements should be made for the establishment of service undertakings so as to ensure their economic subsistence?
4) what are the financial consequences with regard to money invested in and running service centres of varying size?
5) what are the sociological and administrative requirements with respect to the size of the various centres?

1) The level of requirements of the population varies greatly between different countries and parts of the world, depending on the standard of education, the character of the people, the division of labour, standard of living, and so on. Nevertheless a number of things may be mentioned which may be considered as belonging to the most elementary, daily necessities of an agrarian population, e.g. schools, churches, temples or other places of religious worship, medical aid, police stations and administrative buildings, shops and other places where food and other articles of daily use are sold, workshops for making and repairing implements, board and lodging for travellers, and finally recreational facilities in the form of club and meeting houses and the like. Other essential undertakings, services or institutions may, of course, be added to this list, depending on the pattern of the area concerned. For each separate case it will therefore be necessary to draw up a list of all these requirements recurring daily, or almost daily, which might be termed primary necessities, for the satisfaction of which the inhabitants must be able to find the necessary provisions at a short distance from their home and for which service centres are therefore necessary in the first place. Of the primary necessities listed above we can also draw up a scale according to urgency from which it can be seen that some of these necessities are of such importance as to be required even in very small area units. Thus in the example given on p. 30 of the service centres in the land reform units in southern Italy there are some five to six of such “service centres” within the confines of a rural village which only provide about five of the most essential forms of service. To employ more generally known terms, the nucleus of the rural village type might be designated “villages” and the smaller service centres “hamlets”.

If only for economic reasons, it will not be possible to satisfy the less frequently occurring necessities in every village. In fact the enterprises and institutions supplying these necessities are only able to subsist provided their “district” is large enough, i.e. if with the prevailing level of prosperity and consumers’ habits there are sufficient sales to make the business pay. Shops selling furniture, clothing, books, optical wares, etc., schools for higher general and technical education, a hotel, hospital, bank, police court, agricultural market, wholesale businesses, to mention but a few, will usually belong to the type of business or institution which is not met with in every village. Hence for these “secondary” services we require service centres of a higher order which we might term “district centres”. Just as the service area of a village will embrace several hamlets, so the sphere of operations of such a district centre will in turn extend over various villages and their respective areas.
Finally, in large new colonisation areas of many thousands of acres and many inhabitants one might propose to establish service centres of a still higher order termed "regional centres" which would have a true urban character and in which those service institutions and enterprises may be fittingly accommodated which would not generally be able to justify their existence in the smaller places, e.g. a higher law-court, a theatre, hospitals, secondary schools, larger banks, department stores, shops selling special articles, etc.\(^1\)

In order to illustrate the differences in character between the various categories of service centres, next an example will be given pertaining to conditions in Holland, viz. that of the shops which constitute one of the most important groups of service enterprises.

An investigation into the occurrence of the various types of shops in municipalities of different classes of size was carried out by the Central Directorate of Reconstruction and Housing in Holland with a view to the proper town planning of shopping facilities in new urban districts or settlements. For this purpose the shop-inhabitant index (abbreviated S.I.I.) was calculated for the 55 categories into which the shops were divided. By S.I.I. is meant the number of shops per 10,000 inhabitants. The S.I.I.'s found for the various branches were arranged in order of descending magnitude, and it was thereby found that usually three main frequency groups could be distinguished. In the graph in Fig. 5, which is taken from the report of the Central Directorate of Reconstruction and Housing, the

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\(^1\) Dr. Ch. A. P. Takes, Bevolkingscentra in het oude en het nieuwe land, 1948; Alphen a/d Rijn, N. Samson N.V.
S.I.I.'s of the 55 types of shops are shown for the group of municipalities having less than 25,000 inhabitants. In the case of the groups of larger municipalities which the report distinguishes the figures obviously show many differences of detail, but the total picture is substantially the same, the limits of the frequency groups practically corresponding to the serial numbers 9 and 20 of the types of shops. The table in the Appendix shows which types of shops may be included in each of the three frequency groups. In the report frequency groups 1, 2 and 3 are termed local shops, district shops, and city shops respectively, by which is meant that shops belonging to the first 9 categories are even usually found in each locality of a town, those in the second category in every larger district of a town, and those in the last category are mainly all in the city. The local shops supply the most elementary needs of the population so that they do not have to serve a wide area to be able to exist; the district shops supply needs which arise to a considerably lesser extent and one shop accordingly serves a far larger number of inhabitants, while the city shops sell many more special articles so that their existence is only justified in the city of larger towns.

Generally speaking, the above three groups of shops may also be regarded as typical of the categories of service centres in agricultural areas which we distinguished above, i.e. of the villages, district centres and regional centres. It is noticeable that shops dealing in textiles, vegetables and fruit, and particularly bread and groceries, have a S.I.I. which is on a considerably higher level than that of the other types of shops in frequency group 1. If there are smaller nuclei, i.e. hamlets, under the service centres of the "village" type, in each of these there will often even be a living for a small grocer's shop or a bakery, for example.

It entirely depends on local conditions with regard to the area and expected size and distribution of population, standard of living and transport facilities, as well as on the existence of well-equipped service centres in the adjoining land already present, whether service centres of all the categories referred to (hamlets, villages, district and regional centres) should be planned in a specific colonisation area. Thus it is conceivable that in certain cases the lowest order of nucleus, the hamlet, is not required. In the Zuider Zee polders in the Netherlands, for example, where it is chiefly the largest farms that are far from the villages and moreover the land is very flat and even small children cycle to school, no hamlets are being planned and all essential services are concentrated in villages 7 to 9 kilometres (4.5 to 5.5 miles) from each other. Particularly with regard to the question as to whether more important centres (district and regional centres) should also be planned in the new area it is advisable to examine to what extent any localities in the adjacent old land would be capable of performing this function, or a part thereof, for the new area. This can serve the interests of both the old and the new land, the coalescence is thereby furthered, and it may be possible to effect appreciable economies in investments for building new settlements.

2) The factor of permissible distances was already touched upon above. It is a very important factor in designing a system of settlements in a new area. In districts where the
inhabitants are poor and there are few public or private means of transport and most of the population usually go about their business on foot, and where, moreover, the climate and character of the soil make it more difficult to walk, the distances separating the service centres will obviously have to be much smaller than in areas where the inhabitants live under much more favourable conditions in this respect. It is not possible to indicate any general criteria, but it may merely be pointed out that the distance schoolchildren have to go may often provide a reliable index to the maximum permissible distance of the inhabitants living furthest from the nearest essential service centres. For the smallest children in particular the disadvantage of excessive distances will be a very serious one. In areas in which a concentration of the agricultural population in the settlements is to be preferred to a scattered form of settlement obviously the chief factor to be considered is the distances which farmers and/or labourers have to cover in order to reach their fields.

3) Unfortunately it is by no means always possible to make the desirable maximum distance of the scattered population from the service centres the decisive factor in drafting a nucleus plan for a new area. It is clear that where the distance between the nuclei is small the number of such nuclei is proportionately greater, so that the service area of each nucleus will be small. Particularly in areas with extensive agriculture and hence a sparse population the number of inhabitants of the district served by an essential service centre will be so small that it will not be possible to operate profitably the essential businesses and institutions to be established in the centre. In such a case, despite the social desirability of short distances there will be no alternative than to establish a smaller number of service nuclei so that each may be afforded a sufficiently large sphere of influence for the enterprises to have a minimum subsistence level in these nuclei.

4) It may happen that within the limits imposed by desirable distances and possible economic subsistence it is still possible to plan a greater or smaller number of villages. In this case it will be necessary to weigh up the pros and cons of either solution. Firstly, a number of factors may be set against each other whose importance can be expressed more or less exactly in terms of money. In this connection it may be mentioned that the creation of larger (and hence fewer) villages is usually to the advantage of the authorities in the area concerned or the colonising body, whereas smaller (and thus more) villages are actually a greater advantage to the population. The saving which accrues to the colonising body amounts to:

a) a relatively smaller investment in land, streets, houses and public buildings, drains, water mains, electricity supply, etc. It will be obvious, for example, that to build one large school will cost less for land and construction than two small schools having the same total accommodation as the one large school.

b) the lower cost of maintaining and operating the public services. Calculated over the whole area, relatively less teachers, ministers of religion, local government and police officials, etc. will be required in large villages than in a larger number of smaller villages.
Large villages may also benefit the inhabitants financially, inasmuch as it will not be necessary to travel so often to the more distant large district centres for making purchases, since in larger villages there can be better equipped shops, and so on, than in small villages, with the result that more things are available in the villagers' own essential service centre. This will lead to a saving in fares and less productive time will be lost.

As against this potential saving in fares and the like for the inhabitants of large villages is the fact that the inhabitants of small villages save still more in this respect. In fact, whereas a visit to the nearest district centre is only made occasionally, to visit one's own village is a necessity that recurs every day for all sections of the population (visits to school, church, shops, clubhouse, doctor, post office, etc.) so that the saving resulting from the shorter distance to the village will usually be a more important consideration. It will depend on local conditions whether the result of the estimates given here turns out to be in favour of large or small villages.

5) The factors referred to under 4 as being advantages or drawbacks of large or small villages can all be more or less estimated, so that in weighing up these factors it is possible to make a calculation based on these estimates. But there are also other factors which are undoubtedly important but cannot be expressed in figures, although they might occasionally be decisive when making a choice. The following may be mentioned:

**advantages of small villages:**
- less discomfort for the inhabitants owing to the shorter distances to be covered, e.g. in bad weather or when summoning medical assistance in cases of serious illness or accident.
- calculated over the entire area there will be more teachers, doctors, ministers of religion, etc., so that there will be more time for the latter to spend on each member of the population.
- it is easier for small village communities to form closer units, and this may be a great advantage in a system of collective settlement in particular.

**advantages of large villages:**
- greater ease of governing (easier control, greater choice of suitable officials).
- larger and better stocked service enterprises, or more than one enterprise can be established in the same line of business. In the latter case there is less chance of certain enterprises gaining a monopoly position, and this may be regarded as an advantage for the consumers.
- social activities have a better chance of flourishing (more members and better opportunities to find good leaders).
- it is possible for the schools to be larger and better organised, resulting in higher teaching standards.
better organisation of ecclesiastical affairs (in each village a church for the chief denominations) and for the parishioners a smaller financial burden to bear in respect of the construction of churches.

greater security in areas where hostile or criminal elements occur.

It need hardly be said that it is impossible to lay down universally valid rules concerning the choice of a nucleus formation system in a colonisation area. The above remarks are only intended as a summary of the many factors that have to be taken into account in making such a choice. Hence in each individual case it will be necessary to examine the importance of each of these factors and what other factors there are likely to be in the situation concerned which are important for drawing up a plan of nucleus formation.

With regard to the problems relating to the drawing up of a plan for the settlement of a new area, a further point deserves attention, namely in connection with the parcelization and arrangement of the farms. We are here concerned with an idea that in the Netherlands was first introduced by Professor E. W. Hofstee in connection with the parcelization of the new Zuider Zee polders. He pointed out that from social considerations it was advisable to arrange the parcelization in such a way that the inhabitants distributed over the land were not in any doubt as regards the village to which they actually belonged, with the result that the inhabitants of such a village area could form a more closely-knit social unit. This object can be more readily achieved if the plots situated on the boundary of the village area were so planned that as far as possible the fronts faced the village, and if the farm-buildings were always built on the parts of the farms that were closest to the village. In this way a distinct boundary between the two village areas will be formed by an unbuilt-on strip approximately the length of two plots. A further result will be that the scattered population will always live as close as possible to the village. The aim of reducing as much as possible the distances between the scattered population and the village is also furthered by arranging the farms in such a way that so far as possible the smallest farms are nearest to the village and the largest are situated on the confines of the village area. The meaning is illustrated by the diagram shown in Fig. 6. In practice it will by no means always prove possible to carry out consistently the ideas developed here, but in drafting a parcelization plan it is certainly worthwhile bearing these principles in mind and to investigate how far their application is desirable and possible.

To conclude this discussion of the planning problems connected with the settlement of a new area, it should also be observed that one should examine whether it may be anticipated that the rise of a new production area of agricultural raw materials will lead to the establishment of agricultural industries, or whether the settlement factors will in general be such that establishment of industries should be taken into account. In this case favourably located industrial sites will have to be reserved near the larger centres of population in particular, and moreover the separate plans for the settlements will have to be adapted
Elements of physical planning in land reclamation and improvement

Fig. 6. Diagrammatic representation of the arrangement of lots and holdings in a village district.

Legend:
- Village centre
- Canal
- Secondary canal
- Boundary ditch
- Main road
- Polder road
- Farm buildings

Observation:
One of the roads marked (a) will in many cases be designed as a main road, depending on the location of neighbouring villages.

Source: Board of the Zuiderzee Works - The Hague

to these expectations, as the establishment of industries may have far-reaching consequences for transport, housing, recreation, etc., in short for the entire character of the settlement.

4.4. TRANSPORT

1) Waterways. For conveying bulky and relatively low-price materials and commodities such as agricultural produce, fertilizers, fuel, etc., water transport is usually far cheaper than rail or road. On the other hand very large investments are required for constructing waterways especially for shipping. Consequently it is very much a matter of economics to decide whether in certain areas it would be worthwhile undertaking the construction of ship canals in newly reclaimed areas. But should it prove possible to adapt for shipping at comparatively little cost the lines required for irrigation and/or drainage this may be extremely useful in certain cases. When determining the line and profile of the canals, as well as the siting and dimensions of locks, bridges or any other hydraulic works, one should previously take into account the shape and dimensions of the types of vessels usually found in the area.

2) Roads. The road plan for a new area is very closely related to the settlement plan.
The roads may be divided into a number of classes according to their function. The smallest and simplest roads will be those which provide communication between the scattered farms in a given village area and serve to connect these farms to the village (agricultural or farm roads). On such roads there will be little or no through traffic. Of a higher order are the roads linking the villages and connecting them to the district centres. The third category is formed by the roads linking these district centres to one another, to similar settlements in the old land, and to the larger towns (regional centres and other large towns). These roads will have to cope with a far greater and heavier volume of traffic than those which link up the villages and should therefore be of a wider pattern with a heavier road surface.

Lastly, it may be necessary to construct one or more major roads in a new area, i.e. if the area is so large that a fairly large town or towns (regional centres) may be expected to develop therein, or if the new area affords a shorter main-road connection between other important parts of the country. If we term these highest order roads first-class roads, the others might be designated second, third and fourth-class respectively.

A few planning desiderata may be mentioned here with regard to the line of the roads. In the case of all roads the obvious rule is that the connection for which they are intended should generally be obtained in the shortest possible way. This means that unnecessary bends, twists and corners should be avoided. On the other hand, and this is particularly applicable to the fourth-class roads whose total length will generally be greater than that of the others, the roads should be so laid out as to permit a proper use of the kind of parcelization required. One should therefore avoid creating many plots cut off at an angle or of any other abnormal shape, as this would hinder the farmer in carrying out his work.

A completely rectangular parcelization system in which all the roads and canals crossed at right-angles would also have its drawbacks, however, and especially in comparatively large or very large areas, viz. drawbacks from the transport point of view and the unattractive landscape. The main drawback from the point of view of transport is that with the use of such a parcelization pattern the first and second-class roads forming the connections between the important places will often have large right-angles and hence no longer fulfil the requirement that this main traffic roads should be as short as possible. As regards the disadvantages of an unattractive landscape it should be observed a very monotonous landscape with endless dead-straight roads is created in those cases in particular where the areas concerned have few contours. Such roads are unattractive to the persons obliged to use them, i.e. the inhabitants themselves in the first place. Roads of this type (particularly the larger ones) may constitute a danger to motor traffic inasmuch as the driver’s attention is lessened, and there is an increased tendency to accelerate to dangerous speeds. Moreover when driving at night there will be more chance of being dazzled by oncoming traffic. All these factors may lead to accidents at junctions.
Another question deserving attention is that of frontage development. Any kind of building alongside important (first and second-class) roads should be avoided so as to reduce the risk of accidents. On the major roads (fast motor roads) it will even be desirable to avoid any level crossing. Moreover in laying out these more important roads the object will generally be to lead them round the built-up areas of the villages as far as possible, i.e. at a short distance from the centres instead of through them. This prevents traffic from being delayed. It will also be preferable to build as few farms as possible alongside third-class roads. If building cannot be avoided it is better to build on one side only than on both. Finally, buildings will of course be erected on both sides of farm roads so as to use these roads in the most effective way and thus enable a saving to be made on the total length of road required.

As regards the other traffic requirements such as railways and airfields, it will be necessary to examine in each particular case whether their existence is required in the area concerned, whether economic construction is possible or desirable for the promotion of economic progress, and how they can be included in the development plan for the new area according to rational planning methods. It is difficult to give any general lines of guidance in this respect; it should merely be observed that if possible it is often advisable to align a railway parallel and immediately adjacent to a first-class traffic road or a canal. This reduces to a minimum the loss of cultivable land and the interruption of the unity of the area when it is cut up into distinct portions. In fact, financial and traffic considerations will make it necessary for canals and railways, as well as major traffic roads, to be intersected as little as possible by other traffic lines and thus forming distinct boundaries and traffic barriers in the area. In drawing up the plans one should be fully aware of what, from the social point of view, is the extremely separating effect of these traffic requirements.

4.5. LANDSCAPING AND RECREATION

New cultivable lands formed by the drainage of lakes or swamps, the impoldering of sea inlets, the irrigation of areas deficient in water, the development of moorland, etc., will still often be of a flat and bare description when taken into use by man. Hence in order to make them suitable for human habitation it will not only be necessary to ensure a good arrangement as regards the water management, parcelization, traffic and housing, but also to give consideration to the landscaping of the area. Here again a comparison can be drawn with architecture. An architect who is commissioned to design a building fails in his task if his creation finally satisfies every utilitarian requirement but is devoid of all beauty of form and finish.

Hence when drawing up a plan for laying out a newly-reclaimed area it is most desirable to enlist the aid of landscaping experts who will draft a “landscape plan” in close collaboration with the technological, agricultural, sociological and other experts. The chief
means employed for this purpose will obviously be to plan the planting of trees or shrubs in suitable locations. What constitutes such “suitable locations”, and in particular what should be the maximum area planted is often a vexed question. On the farming side the point is often stressed that new, fertile agricultural land is not acquired at the cost of heavy investments in order to plant a considerable proportion thereof with trees. It will therefore be a good plan to provide the vegetation required for clothing the landscape as far as possible at places where the land is least suitable for agriculture. The least fertile land is primarily suitable for this purpose, and on the more fertile land plots having an unfavourable shape, for instance corners cut off by roads or canals, could be preferably reserved for this purpose. It should also be observed that the advantage of planting trees and shrubs is not merely that it enhances the beauty of the landscape but that it may also be useful to man in other respects. Trees planted alongside roads provide the shade so badly needed on these roads during sunny and warm weather. It may also be a very important advantage that in windy climates they break the wind and thus help to control wind erosion on the fields. In extensive, bare districts the trees and shrubs planted can also provide the inhabitants with firewood and useful timber, and moreover they can serve as living and breeding places for birds and other fauna that live on insects harmful to agriculture.

One of the most important results that can be achieved when only a comparatively small area is planted with trees is to break the endless aspect of large bare areas. Rows of trees alongside roads, etc., can split up the area into compartments of a more tractable size for the inhabitants. Near the centres of population the plantations will serve a more recreational purpose and have to be more compact. It should be stressed that for the new towns and villages to be established separate detailed plans will have to be drawn up, and the planners commissioned to do this should take care not merely to variegate and site properly houses, businesses, utility buildings and traffic provisions, but should also pay close attention to the provision of vegetation.

Another way to break the monotony and vastness of large new areas was already mentioned in the discussion of the roads. Without descending to the false romanticism of little winding roads and watercourses a great deal can be achieved in this respect by introducing a number of slight bends in the alignment of roads and canals, marked if necessary by small clumps of trees, and this, as was stated above, will also promote road safety.

It is also advisable to turn to good account the presence of water in the form of canals, dam reservoirs, etc., for enhancing the beauty of the landscape and for the recreational needs of the population. The combination of water and trees is often very attractive and can be brought about by suitable tree-planting at certain places along the banks.

Lastly we should mention the planting of trees and shrubs in farm enclosures. On the
fourth-class roads in particular, along which the farms are built in rows, such a planting alone is a considerable help towards breaking the monotony of the landscape. Moreover this planting gives the farm enclosures the shelter, shade and seclusion they require.

4.6. ADMINISTRATIVE DIVISION

The administrative division may be mentioned as the last of the groups of interests which have to be taken into account in formulating a lay-out plan. Various different systems exist for this purpose in the several countries of the world, although it is often the case that the village and the vicinity based on it constitutes the smallest administrative unit, irrespective of whether such a unit is known as a "municipality" or given some other name. It is, in fact, true to say that in country districts the village community generally forms the smallest territorial unit of persons with common interests, so that the obvious course is to make this territorially indivisible community into an administrative unit as well. If the method of parcelization (see p. 38) has already led to the formation of distinct boundaries between the village districts it will be a comparatively easy matter to draw the boundaries of the administrative units.

Circumstances may occur, however, which make it desirable to depart from this "ideal" state in which the village community as the territorial social unit is at the same time the administrative unit. In several countries with up-to-date development the task of the smallest administrative units has very much increased as development proceeds and the authorities grow more concerned for the welfare of the population, viz. it has increased in the sense that these administrative bodies become responsible for an increasing number of technical services essential to the public interest. We may mention in this connection the responsibility for education, public health, the inspection of building and housing, the provision of electricity, drinking water and gas, the purification of sewage water, the fire brigade service, the police, upkeep of roads, street-lighting, the laying out and maintenance of public gardens, sports and recreation grounds, etc., etc. It is obvious that a well-equipped organisation is essential for carrying out this work in the proper manner and that all this involves a great deal of expense. And it is equally obvious that small administrative units comprising no more than a single village and the country district belonging to it, and whose total number of inhabitants is only a few hundred or perhaps a few thousand, is quite incapable of properly carrying out this task on its own, both on account of the lack of financial resources and of trained staff for the various branches of public service. In such a case several solutions are possible: 1) a number of these tasks are undertaken centrally by a higher administrative unit (province, "departement", "arrondissement", "Kreis", or the like) or by the national authority; 2) a higher administrative unit subsidises the smallest units and also supplies them with the necessary expert staff; 3) a number of small administrative units join forces for certain purposes in an attempt to achieve through co-operation what each are unable to do separately (public
health, industrialisation, public utilities, etc.); 4) a number of small units is combined to form a larger and stronger administrative unit. Combinations of these solutions are also possible. The solution chosen will entirely depend on the situation in the area concerned.

A few points may be mentioned that deserve consideration should it be decided to set up administrative units having more than one village nucleus when dividing up a newly reclaimed area.1)

1) It is desirable to define the territory of the administrative unit in such a way as to include in it entire village districts. This overcomes the drawback of a section of the population which has recourse to a given village for all kinds of services belonging to another administrative unit than the village itself.

2) If possible only those village districts should be combined into one administrative unit that have some kind of common interests differing from those of other adjacent villages. An important criterion, for example, may be the orientation towards the same larger service centre (district or regional centre).

3) The area of the administrative unit should preferably be more or less round (or square) in shape and have a centrally situated main nucleus. This chief place in which the administrative offices will usually be established will then be about equidistant from the remotest parts of its territory.

4) The presence of two or more centres of equal importance within the boundaries of the administrative unit is undesirable as it may lead to a controversy between the two places. The best solution is, of course, obtained when the most centrally situated place is also by far the most important, so that this place obviously becomes the seat of the administration.

5) Particularly suitable as boundaries of administrative units are the elements in the landscape which obviously serve as dividing lines, e.g. rivers, canals, railway lines and major roads (without a frontage).

6) It is undesirable that administrative boundaries should be drawn through built-up areas or made to intersect roads with a building frontage, as a result of which houses in close proximity could belong to different administrative units and might also have different services.

7) In most cases it is advisable not to include urban centres and agricultural districts in the same administrative unit. Since the interests of the urban and rural populations are often entirely divergent there is a risk that the interests of one of these groups (usually the rural population, as in most cases they will be numerically inferior) may become submerged. The boundaries should, however, be drawn round the urban centre sufficiently widely that any anticipated expansion of the town may be wholly incorporated within the town’s own territory.

1) Some directions with regard to the division into municipalities in the Netherlands are given in the following publications from which the directions mentioned here are partly derived: G. H. L. Zeegers, Richtlijnen voor de herziening van de gemeentelijke indeling; Tijdschr. v. Volkshuisvesting en Stedebouw, 1943, bl. 5 and Rapport der provinciale commissie ter bestudering van de gemeentelijke indeling van Nrd. Holland, 1949, part I, Algemene beschouwing.
In practice it is often extremely difficult to apply these principles and any others that may relate to certain areas. Some of the desiderata referred to above are already at variance with each other. Thus rivers, canals, railway lines and major roads were mentioned as being suitable boundaries for administrative units, but in most cases the centres of population will have been built alongside these very lines of communication, or vice versa the artificially laid traffic routes will be intended for these very centres of population. On the other hand it is clear from points 1 and 6 that it is desirable to keep the boundaries at some distance from the built up areas. In such a case it will be necessary to weigh up the pros and cons of various solutions when drawing up a plan for the division into administrative units, and it may then prove necessary to sacrifice one desideratum for another.
5. INADEQUATE PHYSICAL PLANNING IN THE PAST

In §4 we gave an account of the various facets of physical planning work in land reclamation and improvement projects. After reading this one may perhaps be inclined to ask whether, particularly in the case of land reclamation, it is really quite necessary to determine accurately beforehand how all these parts of the project are to work out in the future. Does this not place too great a restraint on the free development of the future community in the new land? Before it is even known who the new inhabitants will be, far less what their likes and requirements will be, the powers that be have determined where and how they are to live, how their roads will run, the site and description of the recreation space, and so on. Would it not be better to leave all this to the free development of the new land? As the need arises the houses, villages, towns, roads, etc. will come into being at the places regarded as most suitable for the purpose by the inhabitants.

The falseness of these arguments, based as they are on the laissez-faire policy of 19th century liberalism, may perhaps best be demonstrated by means of a few examples of what can happen when no well-considered plan has been previously drawn up for laying out the area, or when certain aspects are forgotten in drafting such a plan. To this end we again prefer to take examples from Holland because in this country the acquisition of new cultivable land has gone on through the centuries up till the present day, and a distinct evolution may be observed in the manner in which this work was carried out, as well as in the principles and methods applied. The examples are therefore selected in chronological order and show the result of inadequate planning with respect to each of the aspects discussed, viz. parcelization, water management, settlement, transport, landscaping and administrative division. We hardly need mention that in stressing the errors made in previous projects no criticism of any kind is implied of the persons in charge of these projects, as here we are only concerned with an evolution in the ideas and knowledge regarding the nature, size and importance of the complex of factors that have to be taken into consideration in laying out a new area or reorganizing an existing one. Modern planning theories are not sudden discoveries, but may be looked upon as the result of a
Fig. 7
Narrow and very elongated plots in the peat district near Maartensdijk (province of Utrecht).
Inadequate physical planning in the past gradual development. Moreover, as was shown in the Introduction, there has generally been a great change in the purpose of the projects. Thus each case must be considered in the light of the notions and state of knowledge in the area concerned and the period in question.

We will begin therefore with a few remarks on one of the forms of parcelization evolved in Holland in previous centuries, viz. what was known as “opstrekkende heerden” (farmholdings increasing in length).1) This type of parcelization dating from the Middle Ages has still remained intact to the present day in various parts of Holland. It is based on a right of cultivation granted to the farmers by the authorities in the various districts (in the Middle Ages usually the counts or bishops) for a specified payment, and meant that starting from a previously established width of holding the farmers were entitled to increase this holding lengthwise, usually up to the boundaries of the village or manor. Thus each farmer had the title to the land situated in front of and/or at the back of his cultivated land and to the extensions thereof. In the case of marshy areas the cultivators often established themselves on a sandy ridge, shore-wall, dyke or embankment and began their work of cultivation from this point. In this way there grew up street or dyke villages, very elongated settlements without any actual village centre. The drainage and boundary ditches of the plots were excavated approximately at right-angles to this direction. Thus there arose a parcelization pattern having narrow, but very elongated plots, often several miles long. This is illustrated by the aerial photograph in Fig. 7.

It will be clear that according to modern notions regarding the desirability of a form of parcelization adapted to the husbandry, these farmholdings increasing in length are very unsatisfactory. In order to cultivate his fields the farmer is obliged to cover vast distances, expending a great deal of time and energy, so that the rear parts of the fields will usually be poorly tended and yield small crops. The form of settlement connected with this type of parcelization is very unfavourable from a planning point of view. A village consisting of ribbon building extending for miles on either side of a road cannot have any distinct centre where the service enterprises and institutions are concentrated. For most of the inhabitants the distances from the school, church, shops, etc., will be unnecessarily great. Moreover modern traffic is impeded and the safety of the inhabitants is endangered. The lack of a well-marked centre and the great distance between the ends of the village are a hindrance to the community life of the population and make the provision of public services a costly affair. In a modern land reclamation or improvement project realised with great expense and effort one should certainly try to avoid such a development originating from a right of cultivation existing in a given area and at a given period.

A more rational form of parcelization with the rectangle as the basic pattern makes its appearance in Holland in the 17th century in the first draining of lakes and large-scale peat working. The length and width of the plots are determined by soil use and hydraulic conditions.2) An unimaginative “chess-board” system forms the typical basic pattern of the parcelization plan. In comparatively small areas like the Beemster (a lake drained

1) The information given on this subject is taken from Professor E. W. Hofstee and Dr. A. W. Vlam’s article “Opmerkingen over de ontwikkeling van de perceelsvormen in Nederland” (Some remarks about the development of the systems of land division in the Netherlands); Boor en Spade V, 1952, pp. 194 ff.
2) Hofstee and Vlam, op. cit., p. 230.
Fig. 8. General lay-out of the Beemster (approx. 7,000 hectares - 17,500 acres).
From a publication by Abraham Goos, dated 1615.
in the province of North Holland – Fig. 8) with an approximate area of 7,000 hectares (17,500 acres) this is still tolerable for traffic and from the landscape point of view, but it becomes more objectionable as soon as applied to the Haarlemmermeer (Fig. 9) with an area of 18,000 hectares (45,000 acres), which was drained about the middle of the 19th century, although in Holland itself opinions are still divided on this subject. According to some, the system here adopted of absolutely straight roads and canals several miles long and intersecting at right angles is also in keeping with a modern rational agricultural area from the landscape point of view, but others are of the opinion that such dimensions create too great an impression of endless distance and monotony. It is clear that a person’s view on this subject will largely depend on the circumstances to which he is accustomed; in countries such as Siberia, Canada and the U.S.A. which have vast level areas and enormous distances other criteria will no doubt be applied than in small countries with a very varied and contoured landscape.

Hence although a rational scheme of parcelization (with standard sizes of holdings of 1,000 x 200 metres) had already been worked out for the Haarlemmermeer beforehand, this 19th century reclamation work is a typical example of what happens when too little attention or none at all is paid to the other aspects of the reclamation scheme.

In the first place can be mentioned the defective water control caused by a pumping capacity that was too low and by an insufficient understanding of the need for a deep soil water level. Although there were fairly considerable differences in depth between the middle and sides of the former lake, after it had been pumped dry the same water level was kept for the whole area and too small an area available for water storage.1) As a result, some of the farmers in the new land had to contend with a shortage of water during periods of drought, while others saw their crops rot on account of the excessive ground water level. This led to a bitter struggle about the water level between the “highlanders” and the “lowlanders” which was not finally settled until separate pumping was permitted for the various holdings.2)

This deficiency was still mainly of a technical character, and the same may be said of the provision for traffic requirements. The roads were very bad and often impassable in winter. The approaches to the fixed wooden bridges were far too narrow.3) Water transport was impossible because the canals dug in the polder were not connected to the waterways outside the polder; there were no locks.4)

But there is also very little system observable with regard to settlement. There was, however, something, since when houses began to spring up at random on the new land the “Committee for the Management and Supervision of the Reclamation of the Haarlemmermeer” came to the conclusion “that for churches, schools and everyday needs it was desirable to build two villages in the middle of the polder”.5) Of these two, the most

1) Dr. H. N. ter Veen, De Haarlemmermeer als kolonisatiegebied, Groningen 1925, p. 7.
2) do., p. 41.
3) do., p. 91.
4) do., p. 8.
AMSTERDAM

EXPLANATION:
• navigable waters outside the polder
• navigable waters inside the polder
• roads
• places originally reserved for centres of population
• places where centres have grown up
• centres already in existence in the border area
• entrance lock

Fig. 9. General lay-out of the Haarlemmermeer (approx. 18,000 hectares - 45,000 acres) (without single lots).
Inadequate physical planning in the past

northerly, which was laid out at the point of intersection of the two chief canals and is in
the most central position with respect to the entire polder, has developed more rapidly
and vigorously than the other one to become the recognised leading village. Except for
these two villages, building in the Haarlemmermeer has been a spontaneous growth and
consequently unplanned in character. One consequence of the inadequate transport
facilities in the polder itself was that many persons settled on the dyke alongside the
encircling canal from which point the means of transport outside the polder could be
more easily reached. Moreover the housing shortage in the densely populated surrounding
horticultural areas led to many persons settling on the border of the new area.\(^2\) In this
way ribbon development, extending for many miles, arose at many points along the road
which runs parallel to the encircling canal. In the polder itself small villages or hamlets
sprang up at numerous junctions, chiefly as residential areas for agricultural workers,
but often provided with a small school, church, café, shop or workshop. The extent of the
fragmentation with respect to the housing and care of the inhabitants may be judged
from the fact that in this polder which is only 18,000 hectares (45,000 acres) in area
there are no less than 25 to 30 large and small churches and as many large and small
schools scattered over the entire area. Such a wholesale scattering of buildings is now
a great source of trouble for the municipal and provincial authorities, especially as
regards such public services as laying water-mains, electricity, gas, sewers, and the fire
brigade, police supervision, and so on.

Nor was any previous decision taken as regards the *administrative division*. The boundary
between two provinces ran through the lake. But when the land had been drained and
settled by the colonists an administrative division became an urgent necessity. It was not
till several years after the lake had been drained, during which period the new area had
been a kind of no-man's-land which no single municipality had taken under its jurisdic-
tion and a most irregular state of affairs prevailed, that a law was passed decreeing that the
new area was to constitute a single municipality belonging to the province of North
Holland.\(^2\)

The difference between the technical and planning work that preceded the laying out of
the Wieringermeer, the first Zuider Zee polder, reclaimed in 1930 and covering an area of
20,000 hectares (50,000 acres), and that which preceded the above-mentioned Haarlem-
mermeer in the previous century, is very noticeable. Proper provisions were made with
regard to water management; in view of differences in the height of the bottom the
polder was divided into three sections each having a separate water level. Locks were built
between the polder sections and at the entrances to the waterways on the old land. The
parcelization plan provided for a rational division into parcels and a good road system
connecting with the old land. Lastly, a special planting project was drawn up for the
purpose of beautifying the landscape and providing recreational facilities.

And yet even in the Wieringermeer there was one further important aspect of planning

\(^2\) Ter Veen, op. cit., p. 176.  \(^2\) do., p. 13.
EXPLANATION:
- Navigable waters outside the polder
- Navigable waters inside the polder
- Roads
- Places originally reserved for centres of population
- Places where centres have grown up
- Centres already existing in the border area
- Polder boundary (where there is no encircling canal)
- Entrance lock

Fig. 10. General lay-out of the Wieringermeer (approx. 20,000 ha – 50,000 acres) (without single lots).
Inadequate physical planning in the past

work which did not receive proper consideration, namely that of *the establishment of centres of population*. Taking as a basis the situation in more or less comparable agricultural areas elsewhere in Holland where the distances between the centres of population are 3 to 5 kilometres (2 to 3 miles), five villages were originally planned inside the polder and eight small settlements along the border at points which appeared to be most suitable for the purpose, viz. at intersections of main roads or canals, near locks, the entrances to the polder, the one harbour on the Ysselmeer, etc. (see Fig. 10). Allowance was made for the fact that the centres of population would be slow to grow and that possibly not all villages and hamlets would reach the construction stage. But when colonisation began, calculations based on a provisional plan for the allocation of farms showed that if the population of the villages were to be spread over so many settlements the latter would only be of a small size, so that it would be difficult to equip them properly.¹. It was also considered that with the more rapid modern means of transport it was fully justified to establish a smaller number of population centres, that it was more advantageous to build and equip larger villages and that the latter would also be more practicable. It was therefore provisionally decided not to build more than three centres of population (designated A, B and C in Fig. 10). Consequently the situation has arisen that in view of the function of these nuclei as service centres for the entire polder the distances between them are too small and their distance from the borders of the polder is too great. In view of this it was subsequently decided to build a fourth village in the eastern part of the Wieringermeer.

There is one other respect in which developments in this polder have led to a less than ideal state of affairs. From the outset it was intended that the village designated C should be the *leading polder centre* of the Wieringermeer, on the analogy of Hoofddorp in the Haarlemmermeer. But owing to the fact that in building this place the situation originally envisaged has been departed from, and that it has grown up at a later period than the other two, it has never been able to develop into the real main centre. As the cultivation of the Wieringermeer progressed from the direction of the old land, and the need for housing settlements began to be felt, villages A and B successively arose and the latter, thanks to its favourable situation on the chief waterway, developed into the economic centre of the polder. True it has been possible to make an administrative centre of C, but in fact the function of main centre is now divided between C and B, a situation which does not prove ideal in practice.

This state of affairs in the first Zuider Zee polder has been turned to good account in drawing up the plan for laying out the next one, viz. the North-East Polder which is nearly 2½ times as large (48,000 hectares - 120,000 acres) (see Fig. 11). In this polder the centrally situated capital of Emmeloord has been designed which may be expected to develop into a small town with eight to ten thousand inhabitants. Ten villages have been grouped around it in a regular fashion after a careful study had been made of

¹ Wording en opbouw van de Wieringermeer, pp. 449-450, Wageningen, 1955, (with summary in English).
Fig. 11. General lay-out of the North-East-Polder (approx. 48,000 ha – 120,000 acres) (without single lots).
Inadequate physical planning in the past

the number of villages that would be most desirable for this area. At first it was thought that six, or even five villages would be sufficient. The location of these villages constituted one of the starting points of the subsequent development plan. The sociographical investigation then showed that this number would have to be increased to ten, so that a suitable place had to be found in the already completed development plan for the four villages to be added. Nor is it entirely true to say that in the case of the North-East Polder the population centre plan in its entirety constituted one of the foundations of the entire development plan. This is, however, the case with the third Zuider Zee polder of Eastern Flevoland which was pumped dry in 1957 and reclamation of which is in progress (see Fig. 12).

The drawing up of a plan for the population centres in this polder as a basis of the development plan creates fresh problems of another kind. We have deliberately drawn the Eastern Flevoland Polder on the sketch-map in Fig. 12 and also included the outlines of the last two Zuider Zee polders to be reclaimed, i.e. the Markerwaard and Southern Flevoland, the reason being that these three large polders will, in fact, together form a single large homogeneous area enclosed on three sides by the existing land in which several larger and smaller towns are situated at a short distance from the former coastline. Hence before the larger and smaller towns required could be outlined on a map of this new land it was necessary to examine to what extent the neighbouring existing centres on the old land could fulfil a function for the new polder area. It would be outside our province to examine how this investigation was carried out; suffice it to say that the results showed that several parts of the new polders in the vicinity of the old land may be expected to have recourse to these existing larger and smaller towns for many of their needs, and that for the remaining requirements a central capital, a regional centre (A), as well as four smaller district centres (B, C, D and E) will also be required in the new land. To this should of course be added a number of villages.1)

In conclusion, we should now again point out that in drawing up the plans for the North-East Polder difficulties arose with regard to one other planning facet, viz. to that of the administrative division. In the case of the Wieringermeer this did not constitute any problem, since it lies excentrically to the others and wholly adjoins the province of North Holland. Moreover the area is fairly small (20,000 hectares – 50,000 acres), so that the obvious plan was to make this polder into a separate municipality and to incorporate it in the said province.

With regard to the North-East Polder, however, the problem is not so simple. This new area covers 48,000 hectares and borders on two provinces. The largest municipality in Holland has an area of 34,000 hectares. If the North-East Polder were to be made into a single municipality, as was intended first, it would be exceptionally large by Dutch standards and this might lead to many difficulties for both the population itself and the municipal corporation. Thus, it became clear afterwards that there was much to be said for splitting the polder into several municipalities.2) If in drawing up the development

1) Dr. Ch. A. P. Takes, Bevolkingscentra in het oude en het nieuwe land; Alphen a/d Rijn, 1948.
2) Dr. A. Blaauboer, Inrichting en ontwikkeling van het gemeentelijk bestuur van de Noordoostpolder; Van Zee tot Land, No. 8, Zwolle, 1952 (with summary in English).
WADDENZEE
Amersfoort
Utrecht

EXPLANATION:
Former Zuider Zee coast
Polder dykes (completed)
Polder dykes (planned)
Chief polder canals
Locks
Water
Service centres
Polder villages already established

Fig. 12: General view of the IJsselmeer Polders
plan it had already been decided which was the best manner of doing this, it would have been possible to allow for such a decision in the development plan when arranging the villages and the municipal boundaries. This was not done and it is therefore now proving extremely difficult to find suitable boundaries for the municipalities into which this polder should be divided.

In drawing up the plan for Eastern Flevoland, this aspect has also received attention in time. In amalgamating village districts the criterion taken was the extent to which the villages might be expected to have recourse to the larger centres, while in the case of the capital a separate urban municipality was envisaged.

6. CONCLUSION

In view of the scope of this article there is little need to conclude it with a summary or inferences. In fact, it contains no results of new research on special subjects, nor any details on the studies required in connection with the physical planning work for land reclamation and improvement projects. It was only intended to point out the need for this work and to indicate which aspects were worthy of particular attention. A detailed description of the methods and standards applicable would likewise have little point, for the very reason that in this type of work in particular they are so greatly dependent on conditions in the area concerned. The methods adopted in constructing an engineering work or the calculations these necessarily entail will probably not differ very greatly whether it is undertaken in Europe, Africa, Asia, America or elsewhere; on the other hand in laying out an area for the practice of agriculture and residential purposes widely different criteria will be applied or methods adopted in the various parts of the world, according to the physical features, character and development of the population, the standard of living, and so on.

For reasons that were given above much of what has been discussed above is based on the development of planning work in Dutch land reclamation and improvement projects. It should, however, be borne in mind that it is never intended that persons in other countries should try to set to work in exactly the same way as has been done, and is still being done in Holland; the particular circumstances prevailing in each country will always have to be the starting point of planning work.

If, however, in regions where physical planning has hitherto made little headway, there should be persons who begin to reflect on its use and necessity as a result of this article it will have more than answered its purpose.
APPENDIX

DIVISION OF SHOPS INTO 55 CLASSES AND ARRANGED IN ORDER OF DECREASING SHOP-INHABITANT INDEX

*Source:*
Study of the frequency and distribution of shops –
Central Directorate of Reconstruction and Housing.

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency group 1</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Grocery</td>
</tr>
<tr>
<td>2.</td>
<td>Fruit and vegetables</td>
</tr>
<tr>
<td>3.</td>
<td>Textiles</td>
</tr>
<tr>
<td>4.</td>
<td>Bread</td>
</tr>
<tr>
<td>5.</td>
<td>Dairy produce</td>
</tr>
<tr>
<td>6.</td>
<td>Hairdressers</td>
</tr>
<tr>
<td>7.</td>
<td>Tobacco and tobacco manufactures</td>
</tr>
<tr>
<td>8.</td>
<td>Butcher's shops</td>
</tr>
<tr>
<td>9.</td>
<td>Bicycles, parts and accessories, and bicycle storage</td>
</tr>
<tr>
<td>Frequency group 2</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Druggists' sundries</td>
</tr>
<tr>
<td>11.</td>
<td>Pastries</td>
</tr>
<tr>
<td>12.</td>
<td>Office, school, writing and drawing supplies and books</td>
</tr>
<tr>
<td>13.</td>
<td>Furniture</td>
</tr>
<tr>
<td>14.</td>
<td>Shoes</td>
</tr>
<tr>
<td>15.</td>
<td>Electrical goods and electric lighting appliances (excluding wireless apparatus)</td>
</tr>
<tr>
<td>16.</td>
<td>Alcohol</td>
</tr>
<tr>
<td>17.</td>
<td>Fish, shell-fish and molluscs</td>
</tr>
<tr>
<td>18.</td>
<td>Hardware and tools</td>
</tr>
<tr>
<td>19.</td>
<td>Flowers and plants</td>
</tr>
<tr>
<td>20.</td>
<td>Household goods</td>
</tr>
<tr>
<td>Frequency group 3</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Second-hand goods (excluding antiques)</td>
</tr>
<tr>
<td>22.</td>
<td>Sanitary ware</td>
</tr>
<tr>
<td>23.</td>
<td>Stoves, perambulators, washing machines, gascookers</td>
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<tr>
<td>Code No.</td>
<td>Shop</td>
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<tr>
<td>---------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>24</td>
<td>Fancy goods and toys</td>
</tr>
<tr>
<td>25</td>
<td>Ice-cream</td>
</tr>
<tr>
<td>26</td>
<td>Leather and shoes and parts</td>
</tr>
<tr>
<td>27</td>
<td>Wireless apparatus</td>
</tr>
<tr>
<td>28</td>
<td>Goldsmiths' and silversmiths' wares and jewellery</td>
</tr>
<tr>
<td>29</td>
<td>Clocks and watches</td>
</tr>
<tr>
<td>30</td>
<td>Photographic materials and films</td>
</tr>
<tr>
<td>31</td>
<td>Apothecaries</td>
</tr>
<tr>
<td>32</td>
<td>Live animals and animal supplies</td>
</tr>
<tr>
<td>33</td>
<td>Perfumes, cosmetics and toilet articles</td>
</tr>
<tr>
<td>34</td>
<td>Wallpaper</td>
</tr>
<tr>
<td>35</td>
<td>Meat and meat products</td>
</tr>
<tr>
<td>36</td>
<td>Antiques</td>
</tr>
<tr>
<td>37</td>
<td>Ladies' hats</td>
</tr>
<tr>
<td>38</td>
<td>Articles of leather and suitcases</td>
</tr>
<tr>
<td>39</td>
<td>Glass, porcelain, earthenware and religious articles</td>
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<tr>
<td>40</td>
<td>Postage stamps and philatelists' supplies</td>
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<tr>
<td>41</td>
<td>Game and poultry</td>
</tr>
<tr>
<td>42</td>
<td>Office machines and furniture</td>
</tr>
<tr>
<td>43</td>
<td>Musical instruments</td>
</tr>
<tr>
<td>44</td>
<td>Luxury articles and artware</td>
</tr>
<tr>
<td>45</td>
<td>Optical ware and the like</td>
</tr>
<tr>
<td>46</td>
<td>Pianos and harmoniums</td>
</tr>
<tr>
<td>47</td>
<td>Woodware and home-industry articles</td>
</tr>
<tr>
<td>48</td>
<td>Pictures and frames (not paintings)</td>
</tr>
<tr>
<td>49</td>
<td>Surgical instruments and bandages</td>
</tr>
<tr>
<td>50</td>
<td>Sewing machines and parts</td>
</tr>
<tr>
<td>51</td>
<td>Occasional and garden furniture</td>
</tr>
<tr>
<td>52</td>
<td>Sport goods</td>
</tr>
<tr>
<td>53</td>
<td>Steelware and cutlery</td>
</tr>
<tr>
<td>54</td>
<td>Shops hiring out textiles, linen, formal wear and theatrical dresses</td>
</tr>
<tr>
<td>55</td>
<td>Weapons and ammunition</td>
</tr>
</tbody>
</table>
1. INTRODUCTION
Les projets de mise en valeur et d'amélioration des terres sont encore trop souvent considérés comme concernant exclusivement des travaux de génie rural. Cependant, l'organisation sociale, c'est-à-dire la création des conditions d'un épanouissement le plus favorable possible de la vie individuelle et collective de la population, constitue le couronnement indispensable de tout projet. En effet, dans les régions améliorées ou nouvellement gagnées à la culture — où que ce soit au monde et quelles que soient les circonstances — des êtres humains demeurent ou viendront demeurer et, par conséquent, il vaudra la peine de réfléchir pleinement et à temps au problème des mesures à prendre pour que ces gens trouvent dans ces contrées une vie et des occupations aussi favorables que possible.

2. NOTIONS
Par l'aménagement de l'espace ou „planologie“ on peut entendre l'activité concernant l'ordonnance de la destination et l'usage du sol, tout en tenant compte des exigences de la science, de la pratique et de l'esthétique.

En principe, la planologie comprend tous les domaines de la vie collective qui demandent des terres. On distingue d'ordinaire quatre éléments planologiques: le travail, l'habitat, la récréation et la circulation, quoique ces quatre catégories ne couvrent pas entièrement toutes les destinations du sol.

La dénomination de projets de mise en valeur et d'amélioration des terres comprend tout ce qui se propose, à une échelle importante, de gagner de nouvelles terres à la culture et de les approprier à l'usage des hommes et de leur installation, ainsi que les projets visant à y approprier et améliorer les contrées culturelles existantes.

D'après les conceptions modernes, de tels projets se composent d'un ensemble très complexe de travaux et de mesures touchant des domaines variés.

3. DIFFERENCES ENTRE LA PLANOLOGIE DES TERRES A GAGNER À LA CULTURE ET CELLE DES RÉGIONS CULTURALES À AMÉLIORER
Entre les travaux planologiques visant à la création de toutes nouvelles régions agricoles...
et ceux touchant l'amélioration de régions culturelles existantes, il existe une différence considérable en ce sens que les premiers concernent un ensemble où tout peut encore être aménagé et construit de la manière qui, en considération de conceptions théoriques et particulières, est considérée comme la plus souhaitable, tandis que dans le deuxième cas, la liberté de la conception de plans est bien souvent sérieusement entravée du fait de l'existence de formes historiques de l'utilisation du sol qui, souvent, ne se laissent presque plus modifier.

Pour les personnes occupées dans ces travaux, ceux de la première catégorie auront donc souvent plus d'attrait que les travaux d'amélioration. D'autre part, les travaux planologiques pour les régions nouvelles ne peuvent être basés sur un développement antérieur, de sorte qu'il faut se laisser guider ici par l'image que l'on tente de se former de la communauté future.

Pourtant, la liberté de conception des projets dans une région nouvelle est moins grande qu'on le croit souvent. La situation donnée d'emplacement, de forme et d'étendue de la région, ainsi que le climat, le relief et la nature du sol déterminent souvent dans une large mesure les grandes lignes de l'aménagement de cette région nouvellement gagnée à la culture. Outre cela, la liberté du choix de solutions pour les différents points du projet des travaux se trouve restreinte du fait que les exigences, pouvant être posées par rapport à chacun de ces points, peuvent bien souvent s'opposer entre elles et que par cela, le projet total définitif porte le plus souvent le sceau évident du compromis.

L'activité planologique dans l'amélioration des régions rurales existantes est caractérisée par le fait que pour l'amélioration des terres, on a affaire à une région déjà répartie spatialement, une contrée donc où pour ainsi dire chaque mètre carré de terrain a déjà sa destination, son propriétaire et son usager, une contrée aussi où, en de nombreux endroits, le sol est déjà exploité de telle manière qu'on ne peut rien y changer ou seulement au prix des plus grandes difficultés. Toute amélioration incidente est à peu près sûre d'entrainer des conséquences par rapport à d'autres affectations du terrain. Or, cela rend l'activité planologique dans les régions déjà exploitées d'autant plus difficile que pour l'aménagement de terres nouvelles.

Ajoutons que presque chaque amélioration demande une intervention dans le status quo - souvent bien embrouillé - des relations de propriété et d'affermage, et peut occasionner d'ennuyeuses et interminables procédures juridiques.

La meilleure méthode pour obtenir, aussi au point de vue planologique, les résultats les plus favorables est de procéder à une "amélioration régionale" sous de nombreux aspects, en ensembles aussi vastes que possible, comme cela se fait de nos jours dans les réformes agraires et les remembrements ruraux.

4. LES ÉLÉMENTS DES TRAVAUX PLANOLOGIQUES DANS LA CRÉATION DE TERRES NOUVELLES ET DANS L'AMÉLiorATION DES RÉGIONS EXISTANTES

L'établissement d'un projet d'aménagement de terres nouvellement gagnées ou à améliorer demande le concours d'experts dans différents domaines. Ceux-ci devront exécuter leurs travaux en étroite collaboration, avec le planologue comme coordinateur. Une des principales bases du projet est constituée par une classification exacte des sols et des terrains. Les intérêts dont il faut ensuite tenir compte peuvent se classer en les différents groupes suivants:

4.1. Élémens principaux du régime des eaux

Cette partie du projet d'aménagement d'une nouvelle contrée formera presque toujours un des éléments fondamentaux de ce projet. En effet, la possibilité d'une exploitation agricole
efficace de la nouvelle contrée est entièrement déterminée par la maîtrise des eaux. Les recherches spécialisées au sujet des besoins d'irrigation, de drainage, de dessalage, etc., mèneront à la création d'un réseau de canaux avec leurs ouvrages d'art, tels que les stations de pompage, écluses, barrages, etc., système devant ordinairement former le point de départ du plan des travaux. Il faudra rechercher toujours, de concert avec les personnes qui exécutent l'étude des modes d'habitation et des voies de communication, dans quelle mesure la coordination avec les tracés de canalisations, emplacements de ponts, d'écluses, etc., nécessités par le régime des eaux, est possible et désirable.

4.2. Lotissement et étendue des exploitations

Pour les terres nouvellement mises en culture, il va de soi qu'un lotissement moderne et rationnel entrera généralement le plus en considération. Du point de vue de l'exploitation, le lot idéal est un carré avec les bâtiments de l'exploitation au milieu (fig. 3a). Cependant, on réalise une forte économie sur les frais de construction de chemins et de cours d'eau en donnant aux lots une forme rectangulaire, les deux longueurs étant longées par des fossés de drainage ou des portées d'irrigation, l'un des petits côtés par un chemin ou éventuellement un canal d'irrigation et l'autre par un collecteur de drainage (fig. 3d).

La longueur optimum d'un tel lot rectangulaire, au point de vue de l'économie générale, s'obtient là où le total des frais de travaux d'aménagement d'une part et d'autre part des frais d'exploitation capitalisés est le moindre (fig. 4).

La largeur la plus favorable des lots dépend en premier lieu du degré de mécanisation de l'exploitation, ainsi que des exigences techniques posées par le drainage ou l'irrigation. Dans les limites des possibilités techniques ainsi déterminées, le calcul des frais de travaux et d'entretien pourra probablement fournir des précisions pour la largeur à donner au lot.

Le choix de l'étendue des exploitations sur une terre nouvellement gagnée à la culture dépend de nombreux facteurs, comme le type d'entreprise qui, dans des circonstances données du sol, du climat et du régime des eaux, entre le plus en considération, mais aussi de la situation sociale, économique et politique: nombre de futurs exploitants, grandeur des familles, niveau culturel, moyens financiers, structure sociale de leur contrée d'origine, situation alimentaire dans le pays considéré, offre de main-d'œuvre, conjoncture économique, etc. En bref, cela revient à dire que, dans les limites des possibilités naturelles et techniques, c'est la politique de colonisation qui détermine le choix du type et de l'étendue des exploitations.

4.3. Peuplement

Par rapport aux travaux pour le peuplement d'une terre nouvellement gagnée à la culture, indépendamment de la situation dans la contrée considérée, il se présente toutes sortes de possibilités. Entre les extrêmes, d'une part l'éparpillement total de la population agricole - chaque famille dans son exploitation - et d'autre part la centralisation des logements en quelques grandes colonies, il y a place pour toutes sortes de formes intermédiaires. Toujours, cependant, la concentration en de certains lieux d'entreprises de distribution, de services et d'institutions sera nécessaire. D'après la nature des services qu'ils fournissent, on distinguera parmi ces concentrations d'établissements des hameaux, des villages, des centres régionaux ou provinciaux.

Bien qu'il convienne évidemment de reconnaître ici un certain ordre de grandeur, le nombre des habitants ne doit pas constituer la norme pour la classification des centres de population. C'est qu'en effet, pour un système de peuplement éparpillé, les établissements remplissent presque exclusivement la fonction de lieu de fixation d'entreprises de distribution et d'institutions, tandis que pour le système contraire, elles constituent en même temps des
centres de la population agricole et compteront alors beaucoup plus d’habitants. Il dépendra tout à fait des circonstances si, dans une région nouvellement mise en valeur, des colonies de chacune des quatre catégories mentionnées sont nécessaires. Relief du terrain, climat, nature des entreprises, possibilités de transport, instruction générale, prospérité, structure sociale, etc., tous ces facteurs peuvent présenter de grandes divergences et entraîner de ce fait des exigences tout à fait différentes quant aux méthodes de peuplement.

Dans l’élaboration d’un système de centres de services et de distribution, il faudra surtout envisager les questions suivantes:

a. Quels types de centres de services généraux sont nécessaires en rapport avec le niveau des besoins de la population de la région?

b. Quelles distances de ces centres sont tolérables pour la population épars, compte tenu des moyens de transport disponibles?

c. A quelles exigences doivent satisfaire les établissements d’entreprises de distribution et de services, par rapport à la possibilité d’existence économique de ces entreprises?

d. Quelles sont les conséquences financières concernant le placement de capitaux pour les centres de services généraux de diverses importances, ainsi que concernant l’exploitation de ces centres?

e. Quelles sont les desiderata sociologiques et administratifs quant à la grandeur des différents centres?

Il importe fort de considérer toujours l’établissement d’un projet de peuplement d’une région nouvelle par rapport au lotissement et la disposition des exploitations. C’est que des considérations sociales rendent souhaitable que le lotissement soit effectué de telle manière que, pour la population qui sera éventuellement éparsée dans la contrée, il n’existe aucune incertitude quant au village dont elle fait partie, ce qui permet à la population d’une telle région rurale de constituer une plus étroite unité sociale. Ce but peut être atteint plus aisément si l’on a soin de projeter les lots situés aux limites du territoire du village de telle manière que l’avant de ces lots soit le plus possible tourné vers le village, et en construisant toujours les fermes sur les parties des exploitations les plus rapprochées du village. De cette façon sera créée entre deux territoires ruraux une bande de terre non construite formant clairement séparation, et la population demeurera le plus près possible du village. Si possible, il conviendra en outre de placer les plus petites exploitations près du village et les plus grandes dans la périphérie du territoire (fig. 6).

4.4. Trafic

 Là où c’est possible et souhaitable, les canaux d’écoulement peuvent également être rendus propres à la navigation (arrivée de matières auxiliaires, départ des produits agricoles). Selon les moyens de transport usités dans la région envisagée et l’étendue de cette contrée, des chemins ruraux d’ordre différent seront nécessaires. Pour atteindre les champs, de simples sentiers de terre suffiront souvent. Pour réunir les fermes entre elles et aux colonies les plus petites, il faut ordinairement envisager la construction de chemins empierrés (routes quaternaires). Si l’intensité du trafic entre les villages et entre villages et centres régionaux l’exige, les routes destinées à ce trafic devront être plus grandes (routes tertiaires).

Les centres régionaux pourront ensuite être reliés entre eux et à un centre provincial par des routes d’un ordre plus élevé (secondaires), et il se peut qu’il faille projeter à travers la contrée une ou plusieurs routes de grande circulation (routes primaires).

Par souci de sécurité, il vaut mieux que les grandes routes ne traversent pas les agglomérations, mais les contournent. En outre, on fera bien d’éviter les très longues routes rectilignes et les croisements à angle droit, ainsi que
la construction de maisons le long des voies de grande circulation.
Il est souvent recommandable d’accoupler dans le projet les grandes voies de communication, comme les lignes de chemin de fer, les canaux et les autostrades, qui décourent fortement le paysage, afin d’éviter le morcellement de la région.

4.5. Soins portés au paysage et récréation
Si une terre nouvellement mise en valeur présente une grande étendue plate et nue, un embellissement du paysage s’impose afin de le rendre plus attrayant à habiter par la population de colons. La plantation des cours de fermes et le long des chemins, l’aménagement de bosquets d’agrément près des villages et aux endroits improprels à l’agriculture sont pratiqués à cet effet.
Outre la valeur comme paysage et comme lieu de récréation, l’apport de plantation dans ces lieux dénués peut avoir encore d’autres avantages: ombre, rideaux protecteurs contre le vent, bois de chauffage et de bricolage pour la population.

4.6. Répartition administrative
En faisant le projet d’aménagement il importe de se rendre compte à temps de la manière dont la région peut le mieux être divisée en unités administratives. On pourra alors en tenir compte dans la détermination du plan de lotissement, des emplacements des centres d’habitation, du tracé des routes, etc.
De préférence, on fera de chaque village avec ses environs une unité administrative distincte. Si ce n’est pas possible, p.e. parce que ces unités seraient trop petites pour permettre un fonctionnement administratif convenable, il convient de tenir compte des conditions suivantes:
- Dans l’unité administrative doivent être compris des territoires de villages complets.
- Il est préférable de ne réunir que des territoires ruraux ayant des intérêts communs (p. e. une orientation sur un même centre plus important).
- L’unité administrative aura de préférence une forme plus ou moins ronde ou carrée, le noyau principal se trouvant au centre.
- Comme limites des unités administratives, on utilisera surtout les éléments du paysage ayant une fonction clairement délimitative, comme les rivières, les canaux, les voies de chemin de fer et les autostrades.
- Les limites administratives seront tracées de préférence loin des routes bordées de constructions.
- De façon générale, on évitera de réunir en une même unité administrative d’ordre inférieur des centres urbains avec des territoires ruraux.

5. AMÉNAGEMENT DE L’ESPACE INCOMPLETE DANS LE PASSÉ
Avec l’appui de nombre d’exemples pris aux Pays-Bas – où l’on constate dans les méthodes et principes appliqués dans la mise en valeur des nouvelles terres depuis des siècles une évolution très marquée – la nécessité est démontrée de déterminer très exactement, pour chacun des aspects traités ci-dessus de l’aménagement de terres nouvelles ou à améliorer, ce qu’on désire en faire à l’avenir et que par conséquent, on ne peut laisser tout cela abandonné à son libre développement. Ces exemples ont été, dans leur ordre chronologique, choisis de telle manière que pour chacun des aspects: lotissement, régime des eaux, peuplement, trafic, souci du paysage et répartition administrative, on constate les situations impossibles qui peuvent naître lorsque, lors de la formation du projet d’aménagement d’une région agricole, on ne leur consacre pas à temps toute l’attention nécessaire. Ainsi, un droit de défrichement existant au moyen âge menait à un schéma de lotissement en parcelles étroites et étirées, très défavorables à leur exploitation (fig. 7). Dans les assèchements du 17e siècle, on applique déjà un lotissement rationnel et moderne (fig. 8). Au
19e siècle, lors de l'assèchement du Haarlemmermeer (fig. 9), le régime des eaux était au commencement défectueux, et la conséquence fut que les usagers des terres situées dans la partie centrale creuse du polder avaient à souffrir de l'excès d'eau, tandis que les habitants de la partie proche du bord se plaignaient de la sécheresse. Aux exigences du trafic par terre et par eau aussi, on n'avait accordé qu'une attention insuffisante, ainsi qu'au peuplement. Il en résulta des constructions désordonnées le long des routes, surtout le long des bords du polder. La préparation technique et planologique du Wieringermeer (fig. 10), le premier des polders du Zuyderzee, fut excellente. Seulement, on n'accorda pas assez d'attention à la planification des centres de population, de sorte que dans ce polder, il ne se forma que trois villages, rassemblés au centre du polder. Aucun des trois ne se vit allouer clairement la fonction de chef-lieu du polder. 

Lors de la création du second polder du Zuyderzee, le polder du Nord-Est (fig. 11), ce problème a été étudié avec soin, mais ici encore, en dressant le projet d'aménagement, un des aspects n'a pas retenu suffisamment l'attention, savoir celui de la répartition administrative. Aussi se trouva-t-il plus tard que, pour la division de ce polder en plusieurs communes, il était malaisé de trouver des limites claires et favorables. Dans l'assèchement récent du troisième polder, le Flevoland-Est, on a également tenu compte de la question de la répartition administrative. On constate par ailleurs que dans les projets de l'aménagement des futurs polders du Sud, dont fait partie le Flevoland-Est (fig. 12), le plan des centres de population figure comme une des données fondamentales. Il n'en était pas encore ainsi pour le polder du Nord-Est.

6. CONCLUSION
Il n'y a guère lieu de terminer cet écrit en formulant des conclusions. Il ne se proposait que de démontrer la nécessité de consacrer à temps, lors de la formation de projets d'extension ou d'amélioration de terres, toute l'attention à son côté planologique et, en outre, de désigner les facteurs auxquels il convient alors de faire attention. Les méthodes et les normes qui s'y présentent dépendent dans une large mesure de la situation de la région considérée.
ZUSAMMENFASSUNG

1. EINLEITUNG
Landgewinnungs- und kulturtechnische Projekte werden häufig noch zu sehr als ausschließlich ziviltechnische und agrarische Werke betrachtet. Der soziale Aufbau, d.h. die Schaffung der Vorbedingungen für eine möglichst günstige Entfaltung des individuellen und gemeinschaftlichen Lebens der Bevölkerung, ist jedoch der notwendige Schlussstein jedes Projektes. Denn in verbesserten oder neugewonnenen Gebieten - wo auch in der Welt und unter welchen Umständen es auch sein möge - werden ja Menschen wohnen oder sich ansiedeln und folglich wird es stets die Mühe lohnen, um zeitig und in vollem Umfange die Frage zu beachten, welche Massnahmen erforderlich sind, um dafür zu sorgen, dass für diese Menschen die Lebens- und Arbeitsverhältnisse in den fraglichen Gebieten so gut wie möglich sein werden.


2. BEGRIFFE

Mit „Landgewinnungs- und Landverbesserungsprojekten“ werden alle Projekte gemeint, welche als Ziel haben, in einigermassen grossen Umfange neues Kulturland zu gewinnen und für menschliche Benutzung und Bewohnung geeignet zu machen, sowie auch diejenigen Projekte, mit denen bezweckt wird, bereits in Kultur befindliche Gebiete hierfür in erhöhtem Masse tauglich zu machen.
Den neuerlichen Auffassungen gemäss bestehen derartige Projekte aus einem verwinkelten Komplex von Arbeitsobjekten und Massnahmen auf vielerlei Gebiet.

3. UNTERSCHIEDE ZWISCHEN DER RAUMPLANUNG BEI LANDGEWINNUNG UND BEI LANDVERBESSERUNG

Zwischen der planologischen Arbeit für die Einrichtung von völlig neuen Gebieten und derjenigen zur Verbesserung (Melioration) von bestehenden Gebieten besteht ein durchgreifender Unterschied in dem Sinne, dass im ersten Falle alles noch angelegt und gebaut werden kann in einer Weise, welche auf Grund theoretischer Betrachtungen und persönlicher Auffassungen als am meisten erwünscht erachtet wird, während im zweiten Falle die Freiheit des „Planens“ vielfach in ernstem Masse durch das Vorhandensein von historisch gewachsenen Formen der Bodenbenutzung, an denen oft kaum noch etwas geändert werden kann, gehemmt wird.


Die vorliegenden Verhältnisse bezüglich Lage, Form und Grösse, Klima, Relief, Bodenverfassung, usw., sind oftmals schon in erheblichem Masse bestimmend für die Hauptlinien der Einrichtung eines neugewonnenen Gebietes. Daneben wird die Freiheit in der Auswahl von Lösungen für die einzelnen Facetten des Einrichtungsplanes durch den Umstand beein-

trächtigt, dass die Anforderungen, welche hinsichtlich der einzelnen Teile des Planes gestellt werden, im Widerspruch zu einander stehen können, wodurch der letzten Endes geschaffene Gesamtplan unverkennbar den Charakter eines Kompromisses bekommt.

Kennzeichnend für die planologische Arbeit bei der Landverbesserung ist, dass man mit einem Gebiet zu tun hat, dessen Raum schon eingeteilt ist, ein Gebiet also, in welchem praktisch jeder Quadratmeter bereits einen bestimmten Gebrauchszweck, einen bestimmten Eigentümer und einen bestimmten Gebruacher hat; ein Gebiet, wo an vielen Stellen der Boden in einer derartigen Weisegebraucht wird, dass darin keine Änderung oder nur sehr schwer eine Änderung angebracht werden kann. Jede einzelne Verbesserung zieht nahezu sicher Konsequenzen nach sich hinsichtlich anderer Bodenbestimmungen. Dies macht nun die Planungsarbeit in bestehenden Gebieten soviel schwieriger als bei der Einrichtung von Neuland.

Da kommt noch hinzu, dass beinah jede Änderung einen Eingriff in das bestehende – häufig sehr komplizierte – System der Besitz- und Pachtverhältnisse nötig macht, was ein Anlass zu lästigen und zeitraubenden gerichtlichen Prozessen sein kann.

Die beste Weise, um bei Landverbesserung auch in planologischer Hinsicht möglichst viel Resultat zu erreichen, ist eine vielseitige „Gegendverbesserung“ in möglichst ausgedehnten Komplexen, wie es bei der modernen Flurbereinigung und Bodenreform der Fall ist.

4. DIE ELEMENTE DER PLANUNGSARBEIT BEI LANDGEWINNUNG UND LANDVERBESSERUNG

Bei der Aufstellung eines Planes für die Einrichtung von neugewonnenem oder zu verbesserndem Agrargebiet sind Spezialisten von vielerlei Art erforderlich. Diese werden in enger Zusammenarbeit, wobei der Planologe an erster Stelle als Koordinator auftritt, ihre
Zusammenfassung

Tätigkeit ausüben müssen. Eine der wichtigsten Grundlagen des Planes ist die genaue Boden- und Landklassifizierung.

Die Belange – denen ferner noch Rechnung zu tragen ist – können in nachfolgende Gruppen unterschieden werden:

4.1. Hauptelemente des Wasserhaushalts:

Dieses Teilstück des Planes für die Einrichtung eines Gebietes wird beinahe immer eine der ersten Grundlagen für diesen Plan bilden. Es ist ja so, dass die Möglichkeit, um in dem neuen oder zu verbessernden Gebiete in zweckmäßiger Weise die Landwirtschaft auszuüben, steht und fällt mit der wohl oder nicht vorhandenen guten Wasserbewirtschaftung. Die spezialistische Untersuchung in Bezug auf die Notwendigkeit von Bewässerung, Entwässerung und Dräniung, sowie Entsalzung und dergl. wird zur Anlage eines Systems von Kanälen und Wassergräben führen, mit zugehörigen Baulichkeiten, wie z.B. Pumpwerke, Schleusen, Wehre, usw., was gewöhnlich den ersten Ausgangspunkt für den Einrichtungsplan bildet. Im Einvernehmen mit denjenigen Untersuchern, deren Arbeit auf die in Betracht kommenden Formen von Besiedlung und Verkehrsverbinding gerichtet ist, wird stets festgestellt werden müssen, inwieweit die Koordination mit den für die Zwecke des Wasserhaushalts entworfenen Trassen der Kanäle, Baustellen der Brücken und Schleusen, usw., wünschenswert und möglich ist.

4.2. Parzellierung und Betriebsgrösse:

Für neugeschaffene Landwirtschaftsgebiete kommt naturgemäss eine moderne, rationelle Parzellierung des Geländes gewöhnlich am meisten in Betracht. Vom Gesichtspunkt der Bewirtschaftung aus gesehen ist die ideallste Parzellenform ein Viereck mit dem Wirtschaftsgebäude in der Mitte (Fig. 3a). Die Anlage der Wege und Wasserläufe ist jedoch viel weniger kostspielig, wenn die Parzellen die Form eines Rechtecks bekommen, dessen Längsseiten von Gräben für die Entwässerung oder Bewässerung begrenzt werden, während die eine kurze Seite an einer Landstrasse liegt, die andere kurze Seite dagegen an einem Wasserlauf höherer Ordnung (Fig. 3d). Die am meisten erwünschte Parzellenbreite ist in erster Linie abhängig von dem Umfang, in welchem Landmaschinen verwendet werden, weiter auch von den technischen Erfordernissen betreffs Ent- oder Bewässerung. Innerhalb der hierdurch gezogenen Grenzen der technischen Möglichkeiten wird eine Berechnung der Anlage- und Unterhaltungskosten vielleicht Fingerzeige für die anzuwendende Parzellenbreite geben können.

Die Wahl der Betriebsgrösse hängt von vielen Faktoren ab, z.B. vom Wirtschaftstyp, der unter den gegebenen Verhältnissen – was Boden, Klima und Wasserhaushalt anbelangt – zumeist in Frage kommt, aber auch von der sozialen, ökonomischen und politischen Sachlage: Anzahl, Familiengrössen, Entwicklungsstufe und Vermögenszustand der künftigen Bodenbenutzer, die soziale Struktur in ihrer Heimatgegend, die Ernährungslage in dem betreffenden Lande, das Angebot von Arbeitskräften, die Konjunktur, usw. Kurz gesagt ist es also so, dass im Rahmen der natürlichen und technischen Möglichkeiten die Ansiedlungspolitik bestimmend ist für die Wahl der Betriebstypen und Betriebsgrössen.

4.3. Bewohnung:

Mit Bezug auf die Einrichtung zur Besiedlung bieten sich, je nach den Umständen die dort vorliegen, vielerlei Möglichkeiten. Zwischen dem Äussersten des völlig verstreut Wohnens der Agrarbevölkerung – jede Landwirtschaftsfamilie beim eigenen Betriebe – und dem konzen-
Es wird ganz von den Umständen abhängen, ob in einem Landwirtschaftsgebiete Niederlassungen von allen vier erwähnten Kategorien nötig sind. Relief, Klima, Wirtschaftstypen, Transportmöglichkeiten, Entwicklung, Wohlfahrtsstufe, soziale Struktur, usw., werden grosse Unterschiede zeigen können und demzufolge zu anderen Ansprüchen in Bezug auf die Art und Weise der Bewohnung führen. Es sind vor allem die folgenden Fragen, die beim Entwerfen eines Systems von Versorgungskernen beachtet werden müssen:

a. Welche Typen von Versorgungszentren sind im Hinblick auf die Bedürfnisse der Bevölkerung des betreffenden Gebietes erforderlich?
b. Welche Entfernungen bis zu diesen Zentren sind für die verstreut wohnende Bevölkerung zulässig unter Berücksichtigung der zur Verfügung stehenden Verkehrsmittel?
c. Welche Anforderungen müssen für die Gründung von Versorgungsbetrieben gestellt werden mit Bezug auf die wirtschaftliche Existenzfähigkeit derselben?
d. Welches sind die soziologischen und verwaltungstechnischen Normen, die hinsichtlich der Grösse der einzelnen Zentren als wünschenswert anzusehen sind?

e. Welches sind die finanziellen Konsequenzen in betreff Investition und Bewirtschaftung bei Versorgungskernen von verschiedener Grösse?

Es ist von grosser Bedeutung, die Aufstellung eines Plans für die Besiedlung eines Gebietes stets im Zusammenhang mit der Parzellierung und mit der Anordnung der Betriebe zu sehen. Aus sozialen Erwägungen empfiehlt es sich nämlich, die Einteilung in Parzellen so zu gestalten, dass für die eventuell verstreut wohnende Bevölkerung keine Unsicherheit bestehen bezüglich der Frage, zu welchem Dorfe sie nun eigentlich gehört, wodurch erreicht wird, dass die Einwohnerschaft eines solchen Dorfgewebes eine festere soziale Einheit bilden kann. Die Erreichung dieses Zieles kann dadurch gefördert werden, dass namentlich die an der Grenze gelegenen Parzellen derartig geplant werden, dass die Bauernschaft so nahe wie möglich beim Dorfe wohnt. Wenn es sich einrichten lässt, sollen ferner die kleinsten Betriebe die um die kleinsten Betriebe am dichtesten beim Dorf liegen und die grössten am Aussenrande des Dorfgewebes (siehe Fig. 6).

4.4. Verkehr

Wo es möglich und wünschenswert ist, können die Kanäle für Bewässerung und/oder Entwässerung auch für die Schiffahrt (Zufuhr von Hilfsmitteln; Abfuhr von Landwirtschaftszeugnissen) geeignet gemacht werden.

Oftmals ist es erwünscht, grosse Verkehrsader, z.B. Eisenbahnen, Autobahnen und Kanäle, welche eine stark trennende Wirkung im Landschaftsbild zuge wege bringen, nebeneinander zu projektiern, damit eine mehrfache Zerschneidung der Gegend verhütet wird.

4.5. Landschaftspflege und Erholung

Neben dem landschaftlichen und reaktiven Wert solcher Pflanzungen können diese in derartigen kahlen Gebieten auch andere Vorteile bieten: Schatten, Windschutz, Brennholz und Schirrholz für die Bevölkerung.

4.6. Verwaltungstechnische Einteilung

Verwaltungsgrenzen trassiere man vorzugsweise in weiter Entfernung von bebauten Strassen.
- Im allgemeinen bringe man städtische Zentren nicht mit Agrargebieten in denselben Verwaltungsbezirken niederen Ranges unter.

5. UNVOLLSTÄNDIGE RAUMPLANUNG IN DER VORGANGENHEIT


Die Beispiele sind in chronologischer Reihenfolge so gewählt, dass für jede der Facetten: Parzellierung, Wasserhaushalt, Bewohnung, Verkehr, Landschaftspflege und Verwaltungs-technische Einteilung, ersichtlich ist, zu welcher unerwünschten Situation es führen kann, wenn bei der Aufstellung des Planes für die Einrichtung eines Agrargebietes diesen Punkten nicht rechtzeitig die nötige Aufmerksamkeit gewidmet worden ist.

So führte ein im Mittelalter vorkommendes Urbarmachungsrecht in manchen Gegenden zu einer Parzellierung mit für die Bewirtschaftung ungünstigen, sehr schmalen, aber langgezogenen Parzellen (Fig. 7). Bei den Trockenlegungen des 17. Jahrhunderts bringt man schon eine modern ausschneide, rationale Parzellierung in Anwendung (Fig. 8). Im Haarlemmermerpolder (Fig. 9), der im 19. Jahrhundert trockengelegt wurde, war anfänglich die Wasserbeherrschung noch sehr mangelhaft, mit der Folge, dass die Landgebraucher im tiefen Mittelteil des Polders von einem Wasserüberfluss, dagegen die Bewohner des nahe dem Rande gelegenen Teiles von zu grosser Trockenheit zu leiden hatten. Auch den Erfordernissen des Land- und Wasserverkehrs wurde in ungenügender Weise Rechnung getragen, ebenso wie der Bewohnung. Eine ungeordnete Streifenbebauung, besonders am Rande des Polders entlang, war die Folge. Die technische und planologische Vorbereitung des Wieringermeerpolders (Fig. 10), des ersten der Zuiderseepolder, war jedoch sehr gut. Nur für die Planung der Wohnkerne hatte man damals noch kein genügend geübtes Auge, wodurch in diesem Polder nur drei, nahe beinander liegende Dörfer in der Mitte des Polders zustande kamen. Keines dieser Dörfer erhielt die deutliche Funktion von „Polderhauptort.”

Im zweiten Zuiderseepolder, dem Nordostpolder (Fig. 11), wurde dieses Problem sorgfältig unter die Lupe genommen, aber auch hier wurde bei der Aufstellung des Einrichtungsplanes einer der Facetten noch zu spät Beachtung geschenkt, nämlich der verwaltungstechnischen Einteilung. Nachher stellte sich denn auch heraus, dass es sehr schwierig war, um bei der Gliederung dieses Polders in mehrere Gemeinden dafür deutliche und günstige Begrenzungen zu finden.

Bei dem erst kürzlich trockengelegten dritten Polder, Ostflevoland, wird auch vom Anfang auf diesen Punkt Rücksicht genommen. Weiterhin ist es so, dass bei der Ausarbeitung der Pläne für die Einrichtung der zukünftigen südlichen Polder, von denen Ostflevoland ein Teilstück ist (Fig. 12), der „Wohnkerneplan” als eine der Grundlagen des Entwurfs dient. Beim Nordostpolder war dies noch nicht der Fall.

6. SCHLUSSWORT

Es ist wenig Veranlassung da, diese Abhandlung mit einer Formulierung von Schlussfolgerungen zu beenden. Der Zweck war einzig
und allein, um darzulegen, dass es notwendig ist, bei der Vorbereitung von Landgewinnungs- und Landverbesserungsprojekten der Raumplanung zeitig volle Beachtung zu schenken, und weiter, um auf die Faktoren hinzuweisen, auf die bei solchen Projekten geachtet werden muss. Die Methoden und Massstäbe, welche dabei in Frage kommen, sind stark abhängig von den Verhältnissen in den betreffenden Gebieten.
INTRODUCCIÓN

Los proyectos de rescate o mejoramiento técnico de tierras laborables vienen considerándose con demasiada frecuencia como obras pertenecientes exclusivamente al dominio de la ingeniería rural. La ordenación social, es decir, la creación de las condiciones necesarias para el más favorable desarrollo de la vida del individuo y de la colectividad, constituye, sin embargo, la piedra angular de todo proyecto. En efecto, las tierras rescatadas o mejoradas —cualquier que sean las circunstancias y el lugar en que se encuentren— tendrán o habrán de recibir población humana, de forma que siempre será de gran utilidad considerar con la debida antelación qué medidas han de tomarse para facilitar la existencia y el trabajo de estas poblaciones.

En la ordenación social cabe distinguir tres elementos: la «planología», la política de instalación de colonos y la política cultural. En las presentes consideraciones nos ocuparemos sólo del primero de estos elementos, la «planología», y ello fijándonos en la marcha de las cosas en Holanda, país en el que, por su lucha secular contra el agua, se han ofrecido sobradamente ocasiones de cobrar experiencia en las obras de rescate de tierras laborables, y en el que tanto en el rescate como en la mejora de las tierras se atiende con marcado esmero a la ordenación social.

CONCEPTOS

Se entiende por «planología» o planeamiento territorial las actividades por lo que toca al destino y al aprovechamiento del suelo, habida cuenta de las exigencias de la ciencia, de la práctica y de la estética.

La planología abarca, en principio, todos los dominios de la vida colectiva que exige tierras. Cuatro son los elementos planológicos que suelen distinguirse: el trabajo, la habitación, el recreo y el tráfico.

Por proyectos de puesta en cultivo o mejora técnica de tierras ha de entenderse todos aquellos proyectos cuya finalidad es la adquisición en escala relativamente considerable, de nuevas tierras de cultivo y su habilitación para ser cultivadas y habitadas por el hombre, o bien la de mejorar y hacer más aptas para estos fines zonas agrarias ya en explotación.

De acuerdo con las concepciones modernas, abarcan tales proyectos un extenso complejo de obras y medidas en muy variados terrenos.

DIFERENCIAS QUE PRESENTA LA PLANOGIA DE TIERRAS RESCATADAS Y LA DE MEJORA DE TIERRAS

Entre la labor planológica para la habilitación de zonas de cultivo completamente nuevas y la que requiere el mejoramiento de tierras ya
cultivadas, hay sensible diferencia. En efecto, en el primer caso todo puede ser dispuesto o construido en la forma que se estime más adecuada en vista de consideraciones teóricas o ideas personales; en el segundo caso la libertad de planificación se verá mermada en fuerte medida por la existencia de modalidades de aprovechamiento del suelo resultantes de una evolución histórica, y en las que apenas si cabe introducir modificaciones.

Para los llamados a ocuparse de esta labor, el primer caso resultará, pues, más atractivo que el segundo.

Ahora bien, frente a esto surge la consideración de que en la planología de nuevas zonas agrarias, no se cuenta con el punto de referencia de una evolución en marcha, de forma que a los efectos de la habilitación de la zona, habrán de servir de base los rumbos que aspiramos que siga la futura comunidad.

La libertad de planificación en zonas adquiridas para la agricultura no es, empero, tan grande como a primera vista pudiera parecer. Las circunstancias inmutables de situación, forma y extensión, clima, relieve, condiciones del suelo, etc., son ya de por sí en muchos casos determinantes de las líneas directivas en la habilitación de zonas ganadas para la agricultura. Al mismo tiempo todo proyecto de habilitación presenta múltiples aspectos susceptibles cada uno, de varias soluciones. La libertad de elección se encuentra obstaculizada por causa de que las exigencias que cada uno de ellos establece pueden estar en franca contradicción entre sí, de forma que el proyecto definitivo será, por lo común, una especie de compromiso. Característico en la labor planológica para la mejora técnica de tierras laborables es que nos vemos enfrentados con una zona en que la distribución espacial está ya hecha; una zona, pues, en la que, por así decirlo, cada metro cuadrado tiene su finalidad determinada, su propietario y usuarios determinados, una zona en la que el aprovechamiento del suelo presenta en muchos pun-
dispensable punto de partida para el ulterior desarrollo del plan.

De acuerdo con las personas encargadas de determinar las modalidades de habitación y vías de comunicación más convenientes, habrá de considerarse hasta qué punto es útil y posible su coordinación con el trazado de canales necesarios para el regimen de las aguas, emplazamiento de los puentes, esclusas, etc.

4.2. Distribución parcelaria y extensión de las explotaciones agrícolas

La distribución parcelaria de nuevas zonas puestas en cultivo ha de basarse, como es natural, en las concepciones racionales modernas. Desde el punto de vista del aprovechamiento, la forma ideal de distribución parcelaria es un cuadrilátero con las edificaciones emplazadas en el centro (Fg. 3a).

Ahora bien, la parcelación en forma rectangular, con los lados largos limitados por zanjas para el riego o desagüe, uno de los lados cortos por un camino y el otro por un colector, permite obtener grandes economías en la construcción de carreteras y conducciones de agua (Fg. 3d).

La longitud óptima de tales rectángulos, desde el punto de vista de la economía general, será aquella que permita reducir a un mínimo los gastos de instalación por un lado y los gastos de explotación, por el otro (Fg. 4).

El ancho más adecuado de la parcela depende de la medida en que se haga uso de máquinas, así como de las exigencias técnicas para el desagüe o el riego. Dentro de los límites establecidos por estas exigencias, el cálculo de los gastos de instalación y entretenimiento, llevará generalmente a la determinación de la anchura más indicada para las parcelas.

La determinación de la extensión de las explotaciones en nuevas zonas de cultivo depende de muchos factores, v.g.r. del tipo de explotación que en las circunstancias dadas de suelo, clima y régimen de aguas, se considere como el más adecuado y también de la constelación social, económica y política: número de futuros usuarios, si se trata de familias numerosas o reducidas, grado de instrucción y capacidad económica de los futuros explotantes del suelo, estructura social de la región de que proceden, situación alimenticia en el país en cuestión, mano de obra, coyuntura económica, etc. Resumiendo en breves palabras cuanto antecede podemos decir que dentro del marco de las posibilidades naturales y técnicas, la política de colonización es determinante para la elección del tipo y extensión de las explotaciones.

4.3. Establecimiento de colonos

La habilitación de nuevas zonas de cultivo para el establecimiento de colonos presenta numerosas posibilidades, dentro de las circunstancias reinantes en la zona en cuestión. Entre los dos extremos de una población rural completamente diseminada por la zona - cada una de las familias de colonos en su propia explotación - y una población agrupada en algunas colonias extensas, tenemos numerosas formas intermedias. Ahora bien, en todo caso serán necesarios unos puntos de concentración de empresas de distribución de servicios e instituciones de carácter social.

Según el grado de asistencia que proporcione, estas concentraciones pueden ser clasificadas en: aldeas, pueblos, centros regionales o provinciales. Aunque en esta clasificación se observa indudable orden de menor a mayor, a los efectos de clasificación de los núcleos de población no es el número de habitantes el que sirve de norma. En efecto, en el sistema de establecimiento de la población agraria diseminada, las concentraciones desempeñarán exclusivamente la función de centro de establecimiento de las empresas e instituciones de carácter social, mientras que en el caso opuesto servirán a la vez de residencia a la población agraria y contarán, por lo tanto, con un número de habitantes mucho mayor.
Dependerá por completo de las circunstancias al que en una nueva zona agraria sean o no necesarias concentraciones de las cuatro categorías especificadas.

En efecto, el relieve, el clima, el tipo de explotación, las posibilidades de transporte, el desarrollo cultural, el nivel económico, la estructura social, etc., pueden presentar grandes diferencias y por consiguiente establecer muy diferentes exigencias en cuanto al establecimiento de la población humana.

En el momento de estudiar el sistema de establecimiento de centros de asistencia y abastecimiento habrán de tenerse en cuenta, principalmente, las siguientes cuestiones:

a. ¿Qué tipo de centros de servicios generales son necesarios en relación con el nivel de necesidades de la población en cuestión?

b. ¿Cuáles son las distancias máximas tolerables entre estos centros y las viviendas diseminadas, habida cuenta de los medios de transporte disponibles?

c. ¿Qué exigencias habrán de establecerse a las empresas e instituciones, tomando en consideración las posibilidades de existencia económica de las empresas?

d. ¿Cuáles son las consecuencias financieras en cuanto a las inversiones y explotación de centros de servicios de diferentes categorías?

e. ¿Cuáles son los deseos sociológicos y administrativos en cuanto a la importancia de los diferentes centros?

Al establecer un proyecto para la instalación de colonos en nuevas zonas de cultivo, es de suma importancia considerar este aspecto en íntima relación con la parcelación y disposición de las explotaciones agrícolas. En efecto, desde el punto de vista social es aconsejable estudiar la distribución parcelaria de forma que la población diseminada por la zona sepa en todo momento exactamente a qué pueblo pertenece, con el fin de que los habitantes de tales municipios rurales lleguen a constituir una firme unidad social. La consecución de este fin puede ser favorecida proyectando las parcelas situadas en los límites del término municipal de forma que la cabeza de las mismas esté dirigida hacia el pueblo y la construcción de las edificaciones tenga lugar en el punto más cercano al núcleo municipal. De esta manera quedará entre dos municipios una franja inhabitada que constituirá clara delimitación de los respectivos términos y por otra parte los vecinos se encontrarán lo más cerca posible del núcleo urbano. Y si ello resulta factible, conviene cuidar de que las explotaciones menos extensas se encuentren cerca del pueblo y las más grandes en la periferia del mismo (Fig. 6).

4.4. Comunicaciones

Siempre que resulte posible es de desear que los canales para riego o desagüe sirvan a la vez para el tráfico fluvial (acceso de productos auxiliares, expedición de productos agrícolas).

Con dependencia de los medios de transporte tradicionales en la región en cuestión y de la extensión de la zona será necesario construir caminos rurales de diferente orden. Para el acceso a las tierras de labor bastarán en general el trazado de caminos en tierra. Para la comunicación de las granjas entre sí y con las colonias pequeñas, resultan indicados los caminos pavimentados (de cuarto orden).

Si la intensidad del tráfico de los pueblos entre sí y de estos con las cabezas de partido lo requirieran, las vías de comunicación correspondientes habrán de ser más amplias (de tercer orden). Las cabezas de partido estarán reunidas entre sí y con la capital de provincia por carreteras secundarias (de segundo orden), existiendo también la posibilidad de que haya de proyectarse a través de la zona una o más carreteras de primer orden.

En beneficio de la seguridad conviene que las carreteras principales no atraviesen los núcleos habitados sino que los rodeen. Es también aconsejable evitar las rectas de excesiva longitud y los cruces perpendiculares; tampo-
co deben bordearse de viviendas las carreteras de tráfico intenso. No menos aconsejable es, por lo demás, proyectar las grandes arterias del tráfico, como vías férreas, autopistas y canales, agrupadas, para evitar una excesiva fragmentación de la zona.

4.5. Adorno del paisaje y zonas de recreo
Si las zonas adquiridas para la agricultura comprenden grandes extensiones desnudas y llanas, habrá de cuidarse de «adornar el paisaje» a fin de hacer más agradable la vida de los colonos en ellas. Se impone pues el arbolado de los corrales de las granjas y a lo largo de los caminos así como la disposición de zonas verdes de recreo en las cercanías del pueblo, aprovechándose los puntos poco o nada valiosos para la agricultura.

Fuera de su valor estético y recreativo las plantaciones en zonas desnudas tiene gran valor utilitario: sombra, protección contra el viento, leña, madera de construcción...

4.6. División administrativa
Al establecer un plan de habilitación de nuevas zonas agrarias es necesario considerar con la debida detención qué división en unidades administrativas resultará la más eficaz. Este aspecto puede tenerse en cuenta en el momento de proyectar la distribución parcelaria, la ubicación de los núcleos de población, el trazado de las vías de comunicación, etc.

De preferencia ha de constituirse en unidad administrativa independiente cada uno de los pueblos con su término natural. Si ello no resultara posible, v.gr. por resultar tales unidades demasiado pequeñas para un adecuado ejercicio de las actividades administrativas, conviene tener en cuenta las siguientes consideraciones:

- La unidad administrativa comprenderá siempre términos municipales en su totalidad.
- Sólo se juntarán términos municipales cuando éstos tengan intereses comunes (v.gr. por depender todos de un mismo centro urbano superior).

- Aconsejable es que la unidad administrativa tenga un perímetro regular, redondeado o cuadrado en lo que quepa, con el núcleo administrativo en el centro.
- Los más adecuados límites de las unidades administrativas son aquellos elementos del paisaje que constituyen clara división, como los ríos, canales, vías férreas y autopistas.
- Los límites administrativos se trazarán, de preferencia, a gran distancia de los caminos y carreteras bordeados de edificaciones.
- Evítese el agrupar en una sola unidad administrativa de orden inferior núcleos agrarios de menor importancia con centros urbanos.

5. DEFICIENTE DISTRIBUCIÓN ESPACIAL EN EL PASADO

Basándonos en buena cantidad de ejemplos que nos ofrece Holanda – país en el que los métodos y principios aplicados en el rescate de tierras muestran marcada evolución a través de los siglos – lo que podemos demostrar es que la modalidad futura de las diferentes facetas que presenta la habilitación de zonas agrarias rescatadas o la mejora de zonas existentes, no puede dejarse al azar, sino que ha de ser determinada de antemano con toda exactitud.

Estos ejemplos, dispuestos en orden cronológico, están elegidos de manera que sirvan a demostrar a qué anómalas situaciones puede conducir el que en el plan de habilitación no se haya dedicado la necesaria atención a cada una de las facetas más arriba enumeradas: distribución parcelaria; regulación de las aguas; establecimiento de colonos; comunicaciones; adorno del paisaje y división administrativa.

Así por ejemplo la ley de roturación del suelo que regía en la Edad Media llevó en algunas regiones a un patrón de parcelaciones desfavorable para la buena explotación, con parcelas muy estrechas y alargadas (Fig. 7). En
las desecaciones que se realizaron en el siglo XVII se aplicó ya un sistema de parcelación mucho más racional y moderno (Fig. 8). En el siglo XIX - desecación del lago Harlemermeer - la regulación de las aguas fue en principio muy deficiente con la consecuencia de que los agricultores de la parte central, de más bajo nivel, sufrían inundaciones, mientras que en las franjas limítrofes se experimentaba, por el contrario, el inconveniente de la sequía. Tampoco se dedicó la necesaria atención a las necesidades del tráfico fluvial y terrestre, descuidándose asimismo el aspecto del asentamiento de colonos. Consecuencia de ello fue una disposición de las viviendas a lo largo de las carreteras, de una manera desordenada, solviendo todo en los bordes del «polder» (Fig. 9).

La preparación técnica y planológica del Wieringermeer (Fig. 10), el primero de los pólderes del Zuiderzee, fue muy acertada. Pero se carecía de experiencia en cuanto a la disposición de las concentraciones humanas; el resultado es que en este pólder sólo se han desarrollado tres pueblos, situados en el centro del pólder y muy cerca unos de otros, a ninguno de los cuales le corresponde expresamente la función de «cabeza» del pólder. En el segundo pólder del Zuiderzee, el «Noordoostpolder» (Fig. 11), ya se consideró atentamente este problema, pero también en este caso se descuidó una de las facetas del plan de habilitación, a saber, la división administrativa. Posteriormente se evidenció, en efecto, que al dividir el pólder en municipios resultaba sumamente difícil llegar a una delimitación adecuada y clara de los diferentes términos. En el tercer pólder «Oostelijk Flevoland», que acaba de quedar desecado, se ha considerado ya debidamente esta cuestión. Además al establecer los planes de habilitación de los futuros pólderes meridionales, de los cuales forma parte el «Oostelijk Flevoland» (Fig. 12), la distribución de concentraciones humanas ha sido considerada como uno de los aspectos básicos.

6. CONSIDERACIONES FINALES
La finalidad de la presente exposición no es la de sentar determinadas conclusiones sino sólo la de demostrar que en la preparación de proyectos de rescate de tierras o de mejora de zonas agrarias, es imprescindible dedicar la máxima atención al aspecto planológico, indicándose a la vez qué factores son los que han de tenerse en cuenta al efecto. Pues claro está que los métodos y normas a seguir guardan la más estrecha dependencia con las circunstancias reinantes en la región de que se trate.