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Forsteinrichtungswerk: Standortkarte der Forstamtsbezirke Ichenheim und Offenburg 1 : 5 000 bis 1 : 10 000. Staatliche Forstämter Ichenheim in Lahr 1948 und Offenburg 1948.

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THE BADAJOZ PLAN

An Example of Land Settlement and Regional Development in Spain

With 6 figures and 4 photos

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Zusammenfassung: Der Badajoz-Plan als Beispiel eines ländlichen Siedlungswerkes und Regionalplanung in Spanien.

Der erste Teil des Aufsatzes gibt eine zusammenfassende Übersicht über den gegenwärtigen Stand von Bewässerung, wasserwirtschaftlichen Anlagen und durch die Regierung geförderte ländliche Siedlungsmaßnahmen in Spanien. In einem Land mit den klimatischen Bedingungen wie sie Spanien besitzt, umfassen die Vorteile, die sich aus einer Erweiterung der künstlichen Bewässerung ergeben, wirtschaftliche Stabilität, erhöhte Produktivität, Lösung des Problems der Arbeitslosigkeit und die Erzeugung einer Reihe neuer Produkte, die möglicherweise eine Grundlage zur Industrialisierung bilden. Künstliche Bewässerung hat daher die Kardinalstelle einer umfassenden Wirtschafts- und Sozialpolitik angenommen. Ein kurzer, historischer Rückblick über die Einstellung der künstlichen Bewässerung gegenüber zeigt, wie der Staat infolge der unzureichenden Privatinitiative allmählich die beherrschende Rolle auf diesem Sektor übernommen hat. Gleichzeitig hat Spanien auch ein Programm von Regionalplanungen in Angriff genommen, das sich sehr wohl mit dem anderer Länder vergleichen kann; diese beiden Maßnahmen, Regionalplanung und landwirtschaftliche Verbesserung durch künstliche Bewässerung, werden in manchen Fällen in einem gemeinsamen Programm durchgeführt. Der Umfang und Zweck der größeren Bewässerungspläne wurde von einfachen wasserwirtschaftlichen Maßnahmen zu umfassenden Entwicklungsprogrammen aller Reserven von naturräumlichen oder Verwaltungseinheiten erweitert.

Der eindrucksvollste aller dieser Entwicklungspläne, der Badajoz-Plan, hat das Ziel, die wirtschaftliche Struktur der größten Provinz Spaniens, deren Fläche fast der Belgiens gleichkommt, völlig umzugestalten. Der Plan ist als solcher bemerkenswert, weil er erstens einer der größten wasserwirtschaftlichen und siedlungsfördernden Maßnahmen Europas ist und zweitens die vielen Verflechtungen und Auswirkungen der gegenwärtigen Regionalplanung Spaniens illustriert; drittens ist er auch ein hervorragendes Beispiel für die Arbeit des *Instituto Nacional de Colonización*, der wichtigsten Organisation Spaniens, die sich mit agraren Reformen befaßt.

Bis in die fünfziger Jahre dieses Jahrhunderts war Badajoz hauptsächlich für seine Rückständigkeit und seine lange Geschichte von Unruhen unter seiner Bevölkerung bekannt. Diese Probleme waren wohl zum Teil in den natürlichen Bedingungen begründet, hauptsächlich waren sie jedoch

anthropogen bedingt: nachlässige *latifundios*, niedriger Standard der Bodenkultur, das Unterlassen, die Reserven adäquat auszunutzen und das Fehlen von Verkehrsmitteln und Energiequellen ergaben ein bedauernswertes Bild von Arbeitslosigkeit, Landlosigkeit, schlechten Wohnverhältnissen und Analphabetentum. Die Grundlage des Entwicklungsplanes, der im Jahre 1952 in Angriff genommen wurde, ist die Regulierung des Río Guadiana und die Nutzung seines Wassers zur Bewässerung und Elektrizitätserzeugung. Neun- bis zehntausend Familien werden in 49 neuen Dörfern mit 129 549 ha bewässerten Landes angesiedelt. Dieses umfassende Bewässerungswerk und ein Aufforstungsprogramm, das 50 000 ha umfaßt, gehen Hand in Hand mit einem komplexen Plan von Eisenbahn- und Straßenbau, Elektrifizierung und Industrialisierung. Die bisher ermutigenden Ergebnisse ermöglichen es, den zukünftigen Beitrag von Badajoz für die Volkswirtschaft vorherzusehen: eine erfolgreiche Integration eines rückständigen Gebietes in das Leben der Nation und ein nützlicher Schritt auf dem Wege der Vorbereitung Spaniens für seine engere Verbindung mit dem übrigen Europa.

In the field of agricultural reform and development in Spain, the period since the Civil War has seen notable progress. Numerous organizations have been created, mainly dependent on the Ministry of Agriculture (National Colonization Institute, Land Consolidation Service, National Wheat Service, Soil Conservation Service, Seed Selection Institute, Textile Fibres Institute, etc.) and a considerable body of legislation has been promulgated, formulating government policy and putting into action a large number of national and regional plans.

The scope and aims of individual regional plans vary widely, but the predominant theme has been the construction of major hydraulic works and the extension of irrigation – an understandable emphasis, bearing in mind that 59 per cent of the total area of Spain falls within THORNTHWAITES criteria for arid and semi-arid regions. The assured irrigated area has been increased from 1.3 million hectares (3.1 million acres) in 1940 to some 2 million hectares (4.8 million acres) in 1962, of which about half has been created by the State or developed with State assistance. In the same period reservoir capacity rose from 3,832 million cubic metres to 20,000 million cubic metres. Further projects under study or already started will double the irrigated area, at a cost of 160,000 million pesetas. The total future irrigable area in Spain is now estimated to be 4,357,929 hectares (9,533,115 acres) i.e., 9 per cent of the total area of the country and 22.5 per cent of the cultivated area, though some estimates go as high as 5 or 6 million hectares. The greatest hydraulic possibilities are in the Ebro, Guadalquivir and Tagus basins.

The basic provision of water (dams and principal canals) is the concern of the Ministry of Public Works, operating through the Hydrographic Confederations of the main river basins. Within the irrigated areas, the semi-autonomous Instituto Nacional de Colonización (I.N.C.) has been given the task of settling the transformed land in a pattern of family small-holdings and of organizing its administration and production. From its reconstitution in 1939 up to December, 1962, the I.N.C. had acquired 1,045,846 acres of land by voluntary offer and

expropriation, irrigated well over half that area, settled 47,661 families on the transformed land and housed them in 201 new villages.

Benefits derived from the extension of irrigation

Leaving aside social considerations, for Spain irrigation is vital for agricultural stability. Spanish agriculture has to provide 27–31 per cent of the national income, employ 40 per cent of the active population, provide 60 per cent of exports and at the same time feed the nation – yet under dryfarming conditions being quite without security, mainly due to recurrent drought. While in other countries the desirability of extending irrigation (a very costly business) might be judged from a financial point of view, in Spain, to a certain extent, this consideration is secondary. The irrigation policy can only be abandoned at the risk of leaving the country at the mercy of periods of successive droughts, as in 1945–50.

Irrigation helps to solve both human and economic problems. With its great labour demands it can go a long way to absorbing the mass of surplus rural population. The labour requirements of irrigated land are on the average 390 per cent greater than those of *secano* and if the programme advances at the planned rate of 70,000 hectares per year, one can think in terms of absorbing at least 100,000 persons per year (including non-farming as well as farming population). Increases in agricultural production under *regadío* as compared with dry-farming are very impressive; production of even wheat can be increased by 506 per cent. Thanks to double cropping, the area which can be sown is in excess of the total area of irrigated land – 128.75 per cent greater, on the average. A much greater variety of crops can be grown under irrigation; not only cereals, feed grains and forage crops, but also higher-value industrial plants, vegetables, fruits, plus a great increase in milk and dairy products, generally deficient in Spain. The country has become self-sufficient in tobacco and could become self-sufficient in sugar; Spain now produces over 60 per cent of her cotton requirements as compared with only 10 per cent in the early 1950's. Given access to markets, an extension of irrigation could make Spain the principal fruit and early vegetable supplier of Europe. Certainly, as the Spanish economy grows more complex, her agriculture needs to be guaranteed against any fluctuations which might affect her external trading position.

Increasing State intervention in land development schemes

Not only has agrarian reform in Spain since the latter part of the nineteenth century come to crystallize around irrigation, but an important feature of Spanish progress has been the increasingly dominant role of the State in the face of the inadequacy of private initiative. It is possible to trace chronological stages in the process whereby irrigation has come to represent the main axis of an entire State social policy:

- a) In the early period of hydraulic developments, from 1870 to 1911, irrigation was left in the hands of private enterprise concessionary companies and Irrigation Societies (Comunidades de Regantes). It was the general opinion that as soon as the major hydraulic works had been constructed, the region was as good as transformed; the landowners would complete the transformation, since irrigation was theoretically an excellent business proposition. The fact that land often continued for many years under *secano* was attributed to the disinterest or ignorance of landowners. Only gradually was it realized that after the provision of dams and main canals there remains a whole host of things to be done to complete the transformation – work which is beyond the capacity of individual landowners and requires the permanent active presence of the State.
- b) Between 1911 and 1939 the State gradually emerged as the main party engaged in hydraulic works and irrigation schemes, with increased powers regarding the acquisition of property and its proper cultivation. However, prime responsibility for the putting into practice of irrigation was still left to private interests, who showed themselves still unable or unwilling to respond. Like any complicated machine, an irrigation zone cannot begin to function properly so long as any elements are lacking – as were the secondary networks of feeding and drainage canals, levelling operations, roads, settlements with all their amenities, instruction in irrigation techniques, credit for developments, industrial and commercial complexes – all of these on a much greater scale than any individual landowner or even municipality could afford. In other words, not only was the transformation of great irrigated zones not good business for private interests, but it might actually be ruinous.
- c) In the post-Civil War period the role of the State has been amplified and that of the private sector decreased, so that a stage has now been reached in which the State not only draws up development plans but also finances and executes all the work of transformation down to the last detail.

The revised National Plan of Public Works of April 11, 1939, was followed on December 26 of the same year by the first major agrarian legislation of the presplayed by the Ministry of Public Works, the Colonization of Large Areas, which indicated the parts to be played by the Ministry of Public Works, the Colonization Institute and the National Housing Institute. Even several years after this legislation, which despite past experience still relied to a certain extent on the initiation of private landowners to complete the transformation of the irrigable zones, there remained 300,000 hectares of land dominated by canals but still not irrigated. The resulting comprehensive law of April 21, 1949 – the Law on Colonization and Distribution of Property in Irrigable zones – amplified on July 17, 1958, has guided irrigation, colonization and development policy throughout Spain ever since.

There are other reasons than technical difficulties, expense and complexity which put large-scale land development beyond the possibilities of private initiative. Certainly, these works of agricultural transformation, and especially new irrigation schemes, represent only long-term returns to private investors; but to the State they represent another kind of profit – not simply the conservation and improvement of national resources, increased production, an expanded national economy and higher government income from taxes, but also social peace and security.

Furthermore, a vital consideration for Spain, with its limited capital, is that development schemes come

into operation as quickly as possible. This is the crux of the question; any investment programme, so long as it remains incomplete, simply soaks up money and services without giving anything in return. This is particularly true as far as irrigation is concerned, with its complexity, its costs and the length of time needed to plan and execute the work; and this is one reason why the I.N.C. has been given such wide powers, so that irrigation zones may come into full production as quickly as possible, without waiting for individual enterprise to complete the transformation.

Changes in the concept of land settlement and development

At the same time as laying ever-greater emphasis on State intervention in land-development schemes, Spain has embarked on a programme of regional planning which compares favourably with those in other countries. One of the fundamental problems in the Spanish economy is the unbalance between prosperous industrialized regions and underdeveloped rural ones; these latter, lagging behind, are great impediments to balanced national development. Under this stimulus, the scope of the larger irrigation plans and the concept of colonization have been widened from a simple hydraulic programme for under-exploited land to the integrated development of all the resources of natural and administrative regions.

A first movement in this direction dates from the interwar period: the realization that the control of water supplies is of more than purely local or provincial interest, and the creation of the Hydrographic Confederations in 1926 with powers to co-ordinate the hydraulic resources of whole river basins as geographic units – the first organizations in the world specifically dedicated to this kind of regional planning. For the separate piece-meal analysis of dam, canal and irrigation possibilities was substituted the idea of the river basin as the unit of study, with all its possibilities. The Confederations included agronomic, forestal and industrial services and attempted to co-ordinate the activities of all water-users in the basins, harmonizing their interests and overcoming the impediment of artificial administrative divisions. Affiliation and co-operation became obligatory for all official entities such as municipalities and irrigation associations and also for such private and public enterprises as were dependent on the river and its affluents.

But though the pre-Civil War Hydrographic Confederations produced an amplified view of regional planning and development on the basis of water resources, paving the way for later evolution, most of the good intentions came to nothing. Constitutional chaos proved fatal to a continuous development policy. Most plans, rather than comprehensive, continued to be concerned only with hydraulic installations; individual plans were repeatedly changed in scope; frequent governmental changes made financial support most unreliable, long periods of stagnation separating sporadic bursts of activity.

Each Confederation followed its own course – some active, others less so; some wound up, to be later recreated, others changing their names; until finally, instead of great forces for regional planning, the Confederations became mere administrative organizations.

With the return to normal conditions after the Civil and World Wars, the need to channel development activities in a comprehensive way once more became apparent. An impressive start was made in the late 1940's despite lack of means, acute drought years, and interior and exterior economic and political difficulties, and since then about 100 plans and studies have been drawn up. Most of these regional development plans continue to have one thing in common – they are based on the regulation of a river basin or on a series of fundamental hydraulic installations i.e., the two approaches of regional planning and land development have become one. Programmes of hydraulic works and colonization schemes now need to be thought out on a larger scale; at the same time, irrigation and colonization provide links which tie regional plans closely into national ones.

Over a period of years, these numerous experiments and achievements in regional planning have formed useful antecedents to the First National Economic Development Plan of 1964. Important legislative steps in this transition to a more comprehensive view of regional social and economic planning have been:

- a) The creation in 1946 of the Secretaría-General para la Ordenación Económico-Social, under whose aegis surveys of provincial needs and possibilities were drawn up, such as those of Badajoz (1948), Lerida (1949), Islas de Hierro y Fuerteventura (1951), Jaén (1953), Almería (1953) and Cáceres (1957). Though embodying certain disadvantages, the provincial structure of these plans has the merit of a larger regional concept than earlier development schemas. Whereas previously the unit of action had been the irrigable zone, now in the case of plans such as those of Badajoz and Jaén the National Industrial Institute collaborates with the Ministries of Agriculture and Public Works to solve the socio-economic problems of entire provinces.
- b) By the Decree of February 13, 1958, converted into the Law of December 26, 1958, the more ample concepts and machinery contained in the Badajoz and Jaén Plans were extended to the Irrigable Zones defined under the 1939 legislation. A Directing Commission and auxiliary regional or provincial commissions were created to co-ordinate activities in each zone in Plans of Installations, Colonization, Industrialization and Electrification, and the Irrigable Zones themselves were incorporated into larger groupings embracing entire river systems and provinces. As if to underline the more expansive nature of the new planning, the regional and provincial commissions are presided over by the provincial Civil Governors and include regional and provincial experts and authorities.
- c) Since 1957–58 other comprehensive provincial and regional studies have been made by the Technical Cabinet of the National Syndical Economic Council and by Provincial Technical Service Commissions. A more orderly programming of development projects has been achieved, and groups of provinces with common geoeconomic features have been jointly analysed for greater effectiveness in solving regional problems and wider fields of application of development policies.

The idea of regional planning has now spread to include schemes where the basic accent is no longer on hydraulic works and irrigation e.g., the Development Plan for the Costa del Sol (1958) with its accents on urbanization and tourism; and finally, provincial and municipal authorities and private interests have joined forces to finance extensive studies with a view to the industrialization and general development of their regional resources. The provincial authorities of Cádiz, for instance, have set up a commission of Spanish and foreign experts to study the geology, the potential of the coast line, costs and markets, as bases for a plan of industrialization including the creation of new enterprises, the modernization of existing ones, the attraction of foreign as well as national and local capital, and the provision of continuous work and stable incomes for the labouring masses of the province.

Perhaps the most impressive regional development scheme is that which has its axis in the plains of the middle Guadiana and which aims to transform the economy of the whole of Badajoz, the largest province in Spain, with an area almost equal to that of Belgium. The Badajoz Plan merits attention because of its intrinsic importance as one of the biggest irrigation and colonization schemes in Europe. More to the purpose of this paper, the Plan represents the culmination of a long process of development of ideas and illustrates the many ramifications of present-day regional planning in Spain. It has been called "The Spanish T.V.A."

A preliminary review of conditions in Badajoz prior to the initiation of the Plan in 1952 gives a useful idea of the kind of social and economic problems which in many parts of Spain call for such comprehensive remedies.

Economic and social problems in Badajoz

Up to the 1950's the largest province in Spain (area 21,657 kms²) was best known for its backwardness and long history of unrest. In part these problems have a physical basis. The greater part of Badajoz is a peneplane of slates and quartzites, the exposed basement of the Spanish meseta; soils over great areas are thin and suitable only for rough grazing or woodland. Rainfall is not meagre (the average is 549–650 mms. per year) but is very variable, falling as low as 315 mms.; droughts are fairly common. Crops and livestock are endangered or lost when the spring and autumn rains do not come on time, and considerable unemployment also ensues. To a large extent, however, the problems of Badajoz were of man's own making.

Large properties dominate the economic and social scene. In 1950 a mere 1,482 properties (0.59 per cent of the total number of properties) occupied 51 per cent of the total area of the province; these were holdings ranging from 250 to over 500 hectares. The origins of the *latifundios* in Extremadura go back to the extensive land grants of the Reconquest, but the concentration of property in few hands was emphasized by the subsequent alienation of communal lands and the abuses of the Mesta, which also caused much cultivable land to be put under pasture or simply abandoned. The General Law of May 1st, 1865 reduced 1.3 million hectares of collective prop-

erty in Badajoz (mainly church and town council lands) to slightly more than 75,000 hectares, the remainder passing to private individuals and leaving without land those most in need of it.

Prior to the Plan, the standards of cultivation of the *latifundios* were extremely low. Many estates did not seek high unit yields since they obtained sufficient returns from their sheer size alone. In the national context, the value of the agricultural production of Badajoz is the third highest in Spain. The province is rich in livestock: the biggest sheep (1.4 million head) and pig breeder in Spain, first in the production of wheat and chickpeas, second producer of oats, fourth producer of barley and wine. Within the province, the picture assumes a different aspect. In 1950 only 47.18 per cent of Badajoz was cultivated, and of the 794,971 hectares under cultivation only 6,494 were irrigated. The emphasis was on cereal dry-farming and extensive grazing; 653,000 hectares were under evergreen and cork oak and pines; 800,000 hectares i.e., about 37 per cent of the province, was under rough grazing and scrub, used mainly for pasturing goats and otherwise almost unproductive.

There was little variety in the crops grown – wheat occupied 19.16 per cent of the cultivated area – and accordingly labour demands were sporadic. Methods of cultivation were rudimentary, employing primitive machinery and animal traction; the use of fertilizers was almost unknown. Many districts obtained scarcely 60 per cent of feasible crop returns. Nor was this state of affairs confined only to the poorer soils; the *vegas* of the middle Guadiana are potentially some of the richest soils in Spain, fertile mantles of Quaternary clays, yet 10 years ago these soils, now under irrigation, supported only *secano* cereals, some few olive trees and evergreen oaks, seasonal pastures and often nothing but thistles.

Mining and manufacturing in Badajoz were of little importance. Mineral wealth is not inconsiderable and includes deposits of coal, iron, copper, lead, tin, wolfram, tungsten, vanadium, antimony, mercury, uranium and kaolin; but extraction has been severely limited by the poor quality of the mineral, costly transport due to poor communications, or lack of adequate surveys. Mines are small, operating or closing down according to the state of the market, and output is meagre; thus, though iron is relatively abundant, production in recent years has only been around 200,000 tons of ore per year; coal output has been no more than 20,000 tons per year. Before 1952 industries were mainly limited to the transformation of agricultural products, and even these processes hardly went beyond the primary treatment, except in the case of wine and liquors. Though Badajoz is the most important sheep province in Spain, there was no textile or leather industry; there was no timber industry; cork processing was rudimentary; and though Badajoz comes fourth in Spain in respect of area under olives, most of the oil mills were antiquated and with a low output.

Following an extensive agricultural practice and being almost without industries, the province needed only a modest amount of electricity and an elementary transport system. Road and rail communications were

bad and potentially productive regions were frequently cut off. The largest province in Spain occupied 37th place in respect of thermal electricity production and 44th as regards H.E.P.; 45 towns and villages were without electricity. Prior to the Plan, electricity production within Badajoz itself was only about one-fifth of consumption – 4.5 million kwh/year, an average of 6.5 kwh per head of population compared with a national average of 233 kwh. The deficit was overcome by imports from Sevilla and Salamanca.

The social condition of a large proportion of the population was deplorable. Though without any great urban centres (the provincial capital had a population of 79,291 in 1950; Mérida, once the most important city of Roman Spain, had 25,154 inhabitants) Badajoz was the 7th most populous province in the country, with a population of 815,750 in 1950 – an excessive number bearing in mind the economic structure. The birthrate was the highest in the country – 35.93 per thousand, representing an increase of roughly 10,000 per year. In particular, two sectors of the agrarian population constituted grave problems:

- a) A mass of casual labour, 66,567 strong in 1952, with only 180 days' work in the year, on the average. Unemployment showed a marked seasonal rhythm, being at its worst in the period October–November. There was a daily average of 22,381 labourers unemployed throughout the year; at times as many as 55,000 men were affected; the figure never fell below 16,000. The magnitude of the problem is more clearly seen if one bears in mind that these labourers had approximately 200,000 dependents.
- b) Some 57,000 *yunteros* either without land or with insufficient land to support themselves. The *yunteros* are peasants owning some minimal agricultural equipment (usually including a *yunta* or yoke of work-animals) who take up small tenancies on a share-cropping basis, usually for a year at a time. *Yunteros* invariably operate unremunerative holdings under abusive rent conditions and have no security of tenure. In Badajoz most share-tenancies fell far short of absorbing all the labour available – often only 40–50 days per year out of a possible, say, 280. The prospects of finding tenancies were greatly limited by the large areas of potentially cultivable land left under grazing. To this group of under-employed *yunteros* should also be added some 200,000 dependents.

If one adds to the above figures the 8,216 people classed as “unproductive” and a further 6,877 in menial domestic service, one finds that 50 per cent of the population of Badajoz was without guaranteed employment, and an even greater proportion had an almost nominal income and an extraordinarily low standard of living. Although the provincial income of Badajoz was the 12th highest in Spain, in average income per inhabitant Badajoz occupied 44th place. In 1950 there were 640,000 people with a daily income of 8 pesetas or less and 260,000 with a daily income of 3 pesetas or less i.e., 87.5 per cent of the population had an income below the national average, completely unable to save and often in debt. The average labourer's family was probably in debt to the extent of 2,800 pesetas per year.

In 1950 there was an estimated deficit of 14,850 working-class dwellings in Badajoz and 22,321 of the existing dwellings were classified as insanitary or ruinous. With a general lack of school facilities it is not surprising that of the agricultural population over 10 years of age 29.38 per cent was illiterate; the percentage was higher among women – 34.64 per cent, probably the highest in Spain. Emigration from a large number of villages had assumed serious proportions.

The remedy

It was difficult for Badajoz to solve this situation itself. There was insufficient capital within the province for industrialization; small savings did not exist, while an average of 500 million pesetas in rents (18.5 per cent of total rents) left Badajoz every year in payment to absentee landlords.

In the past, most attempts to remedy the problems of Badajoz were based on the expropriation and redistribution of land. These attempts laid great stress on the social aspects of reform and largely ignored the economic repercussions. The Ley de Colonización y Repoblación Interior of 1907 (the first colonization legislation in Spain) saw some large properties parcelled out. When the Republican Ley de Reforma Agraria of 1932 led to chaos, the government fell back on the palliative of trying to absorb excess labour in public works such as road-building.

Nowadays, as then, it is not enough to subdivide and redistribute *secano*. In 1950, for a cost of 5,374 million pesetas, the government could have applied the Law of Expropriation for Social Interest and redistributed 537,400 hectares in lots of 10 hectares among 53,740 settlers and their families. Such a policy would have created little or no new wealth or greater production and would only have brought into being thousands of holdings too uneconomic to benefit the province or the country in any way. A change in the size of farms rarely better the living standards of the agricultural population or favours agricultural development unless it is followed by a change in the type of production and other measures such as industrialization.

Following on the strongly-worded 1948 report of the provincial Junta de Ordenación, a Mixed Technical Commission was created on September 11, 1951, to prepare a co-ordinated plan for Badajoz, the basic aims of which would be the rational and integral use of the resources of the province, especially through the regulation of the waters of the Guadiana, the raising of the cultural and technical abilities of the population, and the improvement of living conditions, especially in food and housing. The Plan was approved on April 7, 1952; its full title gives an idea of its scope – “Co-ordinated Plan of Public Works, Colonization, Industrialization and Electrification of the Irrigable Plains of the Guadiana in the Province of Badajoz, and of industries and other urgent developments in the same Province”. The Plan is expected to be completed by 1967, with provision for a further stage up to 1970. Over the first period of 15 years the State is expending 9,546.1 million pesetas

on hydraulic works, colonization, reforestation, roads, railways and port improvements; in addition the Instituto Nacional de Industria is investing 275 million pesetas in new industries and mining investigations, and it is hoped that private investments in the same sector will reach almost 1000 million pesetas.

Harnessing the Guadiana

The basis of the Badajoz Plan is the regulation of the Rio Guadiana and the utilization of its waters for irrigation and hydro-electricity production (Fig. 1).

Up to the present, the considerable hydraulic resources of the Guadiana system have had almost no practical application, either running to waste or causing flood damage. The catchment basin of the Guadiana is extensive – some 55,000 square kilometres of which 40,000 are in Spain. The river itself

is 820 kms. long; for 358 kms. it flows through Badajoz, receiving 76 tributaries of which some are important in themselves e.g., the Zújar (220 kms. long) and the Matachel (126.5). The flow of the system is irregular, both seasonally and from year to year. In 1947, for instance, the maximum flow of the Guadiana at the provincial capital was 10,000 m³/sec., the minimum was 4 m³/sec. and the average was 1007 m³/sec. Over the period 1936–1955 the average annual flow was 2,476 million m³, but the oscillation was from as low as 500 million m³ to as high as 7,000 million m³.

The construction of 5 main dams along the Guadiana, Zújar and Matachel, with a total reservoir capacity of 3,786 million m³, aims to solve the problem of recurring drought years. The amount of water available for irrigation should be 1,300–1,500 million m³/year, enough to irrigate approximately

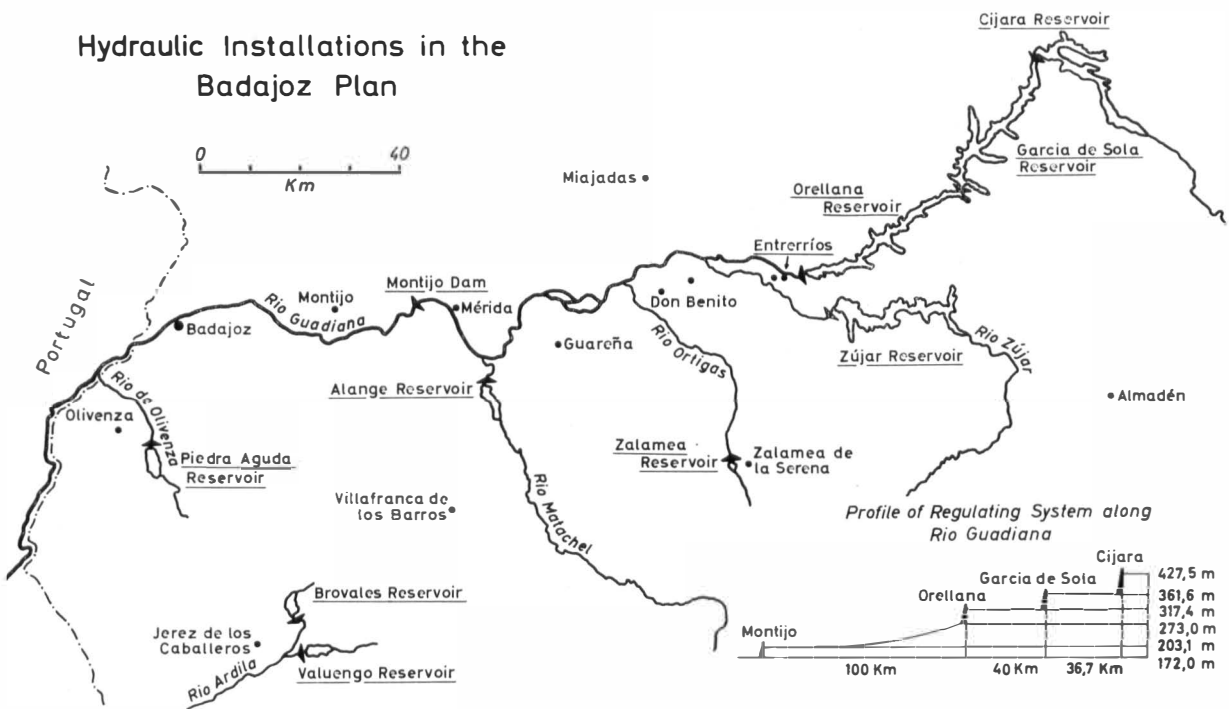


Fig. 1: Details of dams and reservoirs in the Badajoz Plan

Montijo Dam: completes 1954; dam: length 360 m. (3,100 m. including dykes and spillway to control floods); reservoir: capacity 8 million m³.

Orellana Reservoir: completes 1960; dam: height 61 m., discharge capacity 3,140 m³/sec.; reservoir: capacity 800 million m³; surface area 5,500 has., length 35 kms.

Cijara Reservoir: completes 1956; dam: height 80.5 m., length 295 m., discharge capacity 4,800 m³/sec.; reservoir: capacity 1,670 million m³, surface area 6,300 has., length 45 kms.

Piedra Aguda Reservoir: completes 1957; dam: height 26 m., length 197.2 m.; reservoir: capacity 16,25 million m³.

Alange Reservoir: projected; dam: height 32.2 m., length 246 m., discharge capacity 4000 m³/sec.; reservoir: capacity 63 million m³, surface area 4066 has., length 10 kms.

Entrerríos: pumping stations; total capacity 1,170 litres/sec.

García de Sola Reservoir: completes 1962; dam: height 58.8 m., length 225 m., discharge capacity 4,700 m³/sec.; reservoir: capacity 530 million m³, surface area 3,550 has., length 35 kms.

Zalamea Reservoir: improvement of 18th century dam.

Brovales Reservoir: completes 1959; dam: height 18.5 m., length 503 m.; reservoir: capacity 6,98 million m³.

Valungo Reservoir: completed 1957; dam: height 32.74 m., length 197.2 m.; reservoir: capacity 15,25 million m³.

Zújar Reservoir: completes 1963; dam: height 60.5 m., length 350 m., discharge capacity 2,000 m³/sec.; reservoir: capacity 723 million m³, surface area 2,300 has., length 35 kms.

130,000 hectares. Four of these dams (Cijara, García de Sola, Orellana and Zújar) are in the foothills of the quartzite Montes de Toledo, where narrow passes facilitate dam construction and the formation of large reservoirs. The Cijara installation is the largest single reservoir in Spain, exceeded only by the dual Entrepénas-Buendía system east of Madrid. Downstream of Mérida, the Montijo derivation dam feeds the irrigation canals of the Vegas Bajas, and elsewhere in the province four other reservoirs, with a combined capacity at present of 39 million m³, supplement the scheme.

Irrigating the Guadiana Plains (see phot. 1-4)

The Vegas Altas and Bajas (the plains of La Serena and Mérida-Badajoz) which cross the province almost completely from east to west, offer excellent conditions for irrigation. They have both good soils and great breadth (a total area of 417,700 hectares from Orellana la Vieja to the Portuguese frontier), unusual features in Spain, where most of the largest rivers either flow in narrow incised valleys

or are closely bordered by high terraces. Given an assured water-supply, the climate permits almost all kinds of cultivation. Summer temperatures reach 46° C in the shade; winters are not excessively wet or cold; days with rain do not exceed 66 in the year; and annual insolation exceeds 3,000 hours.

Two large areas are being transformed by the State for colonization (Fig. 2 and 3). The Orellana and Zújar canals dominate the Vegas Altas, with an irrigable area of 75,809 hectares, and the Montijo and Lobón canals dominate the Vegas Bajas (36,833 hectares). The zone irrigated by the Alange canal (3,531 hectares) will eventually link the Vegas Altas and Bajas. Water raised directly from the Guadiana will in due course irrigate 10,000 hectares below Badajoz, and independently of the foregoing, 3,376 hectares have been irrigated in local schemes in the districts of Entrerriós, Zalamea de la Serena, Jerez de los Caballeros and Olivenza. Altogether 129,549 hectares are to be irrigated by 454 kms. of main canals and 4,984 kms. of secondary canals. This represents 9 per cent of the total area irrigated in



1



2



3



4

Photo 1: The Montijo derivation dam, feeding the Montijo and Lobón canals which irrigate the 36,833 hectares of the Vegas Bajas

Photo 2: The Vegas Bajas near the new village of Guadiana del Caudillo, showing the pattern of colonists' holdings, main and secondary canals, and new roads

Photo 3: The new village of Entrerriós in the Vegas Altas, housing 133 families

Photo 4: The key-piece of the Guadiana regulating system; the Cijara dam and generating station, completed 1956

(Photos: Courtesy *Trabajos Fotográficos Aereos*)

Spain and is equal to the *vegas* of Valencia. A final stage 1967–70 may amplify the irrigated area by a further 12,227 hectares.

The transformation process is not simply a matter of conveying water to the land. Deep-ploughing is necessary, to uproot scrub and trees. The land must be terraced and levelled to avoid erosion, pool formation and irregularities of surface where irrigation water could not reach, and also to reduce as much as possible the network of canals, drains and roads, to save cultivation costs, and to keep to a minimum the amount of irrigation water needed. Fortunately, the costs of banking and levelling are lowered because the gradient of the *vegas* is gentle (1:1000 in the Vegas Altas and 1:2000 in the Vegas Bajas).

Irrigation is making the Guadiana plains one of the most productive zones in Spain. The conversion from *secano* to *regadío* increases the value of the produce of the land 8–10 times. In the areas already transformed by 1955, production indices had risen from less than 2,000 pesetas/hectare/year to 12,325 pesetas/hectare/year. Moreover, in terms of the absorption of surplus rural population, whereas 100 hectares of *secano* needs only 8 labourers to work it, a similar area under irrigation at I.N.C. standards requires 53 labourers. As the transformation has proceeded there has been an increase in income from the land of 4,000 million pesetas, which has helped to pay for the settlement process.

Land settlement

Between nine and ten thousand peasant families are being settled on the irrigated land. Most of the settlers are drawn from towns and villages in Badajoz with serious social problems, but some with experience of irrigation techniques have come from other provinces to serve as pioneers and examples to the rest.

The settlement process is being carried out according to the Law on Colonization and Distribution of Property in Irrigable Zones of 1949, and will serve to illustrate policy throughout Spain. When the colonization of a zone has been declared to be of national interest, the land is classified into 3 groups:

- a) "Excepted land". Properties already under irrigation, whatever their size, remain in the hands of their owners.
- b) "Land in reserve". Part of the land which is not under irrigation is left to its proprietors in proportion to the area they own and the number of their dependents. The land thus "reserved" to a proprietor is never more than 125 hectares. It must be put under irrigation and must fulfill the production indices set by the Colonization Institute.
- c) "Land in excess" is acquired by the State, compensation being paid at dry-farming values.

The large areas of *secano* thus taken over by the I.N.C. are subdivided into holdings of 4–5 hectares, which are irrigated and transferred to colonists on easy terms. In addition to land, each family receives a dwelling house, farm implements, seed, fertilizers and livestock. For the first 5 years (the "period of tutelage") the colonist works on a partnership basis

with the I.N.C., repaying in kind the cost of capital equipment (implements, livestock, seed, fertilizers) by young stock and percentages of certain basic crops such as wheat, maize and cotton. After this initial period the colonist acquires full title to his holding (house and land). Over a subsequent period of 25–30 years the colonist also pays back to the State the total value of the land, 60 per cent of the cost of public works (canals, roads, levelling operations) and 70 per cent of the cost of private items (house and agricultural buildings). The current costs of these operations are: 30–40,000 pesetas per hectare put under irrigation, plus some 10,000 pesetas hectare to each colonist at the outset in livestock and equipment, and a further 2–3,000 pesetas/hectare during each year of tutelage, in seed, etc. The State thus recovers a large part of its outlay from the colonists and other beneficiaries, quite apart from income from sales of light, power and water from the hydraulic works.

Since the cultivation of the newly-irrigated land needs six times as much labour as *secano*, a number of labourers' houses have also been built, each with a plot of 0.50 hectare, forming a kitchen garden.

It is I.N.C. policy to concentrate the settlers' dwellings in new village nuclei – a contrast with Italian colonization policy, in which scattered farmsteads have been the rule – on the grounds that it is more economic to provide services of all kinds for villages rather than for individual houses. A total of 49 new *pueblos* is being built in the Guadiana plains, ranging in size up to Guadiana del Caudillo with 336 houses and Valdivia with 403. Each *pueblo* has a radius of activity of 2–3 kilometres. Some few isolated houses have been built on holdings which lie at inconvenient distances from these nuclei. The new villages are models not only of architecture but also of a social organization hitherto unknown to the majority of the colonists – possessing not only the essential public services but also town halls, churches, clinics, co-operative stores, cinemas and quarters for syndical organizations, youth clubs and women's associations, all of which aim to foster a sense of unity among the settlers.

The new farmers receive the encouragement and support of a considerable training and advisory service – essential if so large an irrigated zone is to function properly and also because the majority of the colonists need basic instruction in the management of livestock and irrigation techniques. Irrigation practice is not the same in all parts of Spain and certainly is not the same as *secano* cultivation, whence come the majority of settlers; even the crops grown – rice, beet, potatoes, tobacco, alfalfa, cotton, hemp, fruit trees – are new to many of them. Since it is precisely these thousands of new irrigators who are expected to provide the immediate high returns which will save the development schemes from inflation and pay off the investment so that new projects can go forward, the importance of their adequate instruction is evident. The I.N.C. conducts numerous experiments in soil sampling, cultivation and livestock rearing before any transformation is begun, and makes detailed observations of such irrigation as

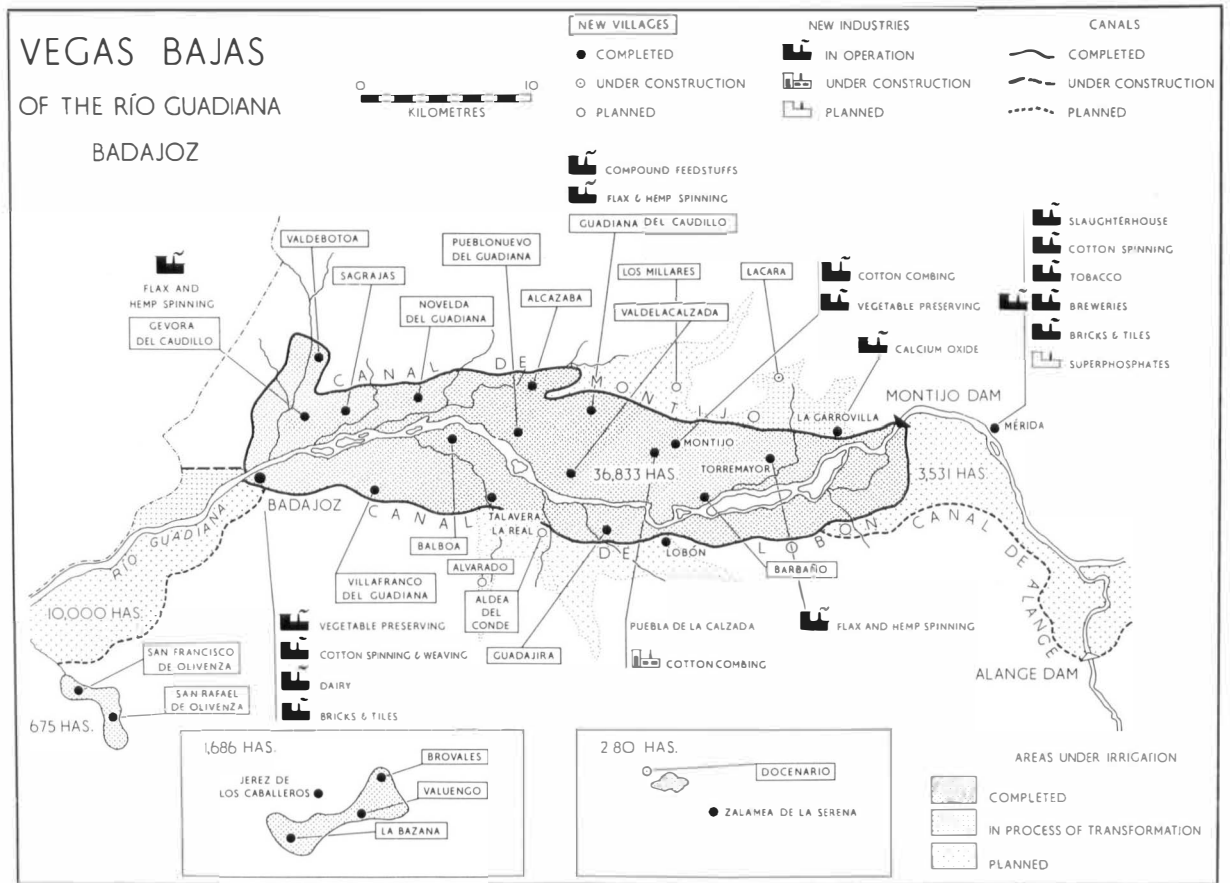


Fig. 2: Progress in the Vegas Bajas up to December 31st, 1962

may already exist in the zone. On these bases the Insitute lays down cultivation programmes of crops and rotations which must be followed by the colonist. In Badajoz foremen are trained at the experimental farm of "La Orden" in the Vegas Bajas, at the ratio of one foreman for each group of 50 colonists, and teams of specialists can be called upon to visit any zone to solve any problem. Intensive courses for the colonists themselves, in techniques such as plague control and stock feeding, are run by the I.N.C., by the Escuela Sindical de Formación Agrícola in Badajoz, by the Agricultural Extension Service and by training schools and colleges throughout the province. The Agricultural Extension Service (S. E. A.) is gradually coming to play a more important role than the advisory services of the I.N.C. and Ministry of Public Works, which to a certain extent lack co-ordination; with its great numbers of specialists, the S.E.A. is becoming one of the most active departments of the Ministry of Agriculture.

Much stress is laid on the encouragement of productivity and a spirit of co-operation among the colonists, and one of the most heartening phenomena has been the formation of co-operative organizations such as the Co-operativa de Regantes de Extremadura.

Reafforestation

Badajoz is the most important province in Spain in the annual value of its woodland products. Roughly half the total area of the province is woodland or degenerated woodland. There are still 927,724 hectares of evergreen, cork, Turkey and muricated oaks, and mixed species, but these have often been excessively thinned-out for pasture; the evergreen oaks in particular are subject to attack by lizards, with considerable economic losses. Vast areas of former woodland have been reduced to *matorral*, mainly made up of *cistus*, through cutting, firing and clearing for cultivation which has subsequently had to be abandoned. While the open woodlands (*dehesas*) represent some economic returns, the value of the *matorral* is almost nil except for grazing goats. Large areas are devoid of all vegetation due to erosion.

The Plan provides for the reafforestation of 50,000 hectares of land not suitable for other uses, at the rate of 5,000 hectares per year. Most planting is being done in the north-east of the province (the so-called "Siberia Extremeña") in the catchment areas of the reservoirs (Fig. 4). Besides helping to prevent silting in the reservoirs, the reafforestation provides a new source of wealth to villages such as Villarta de

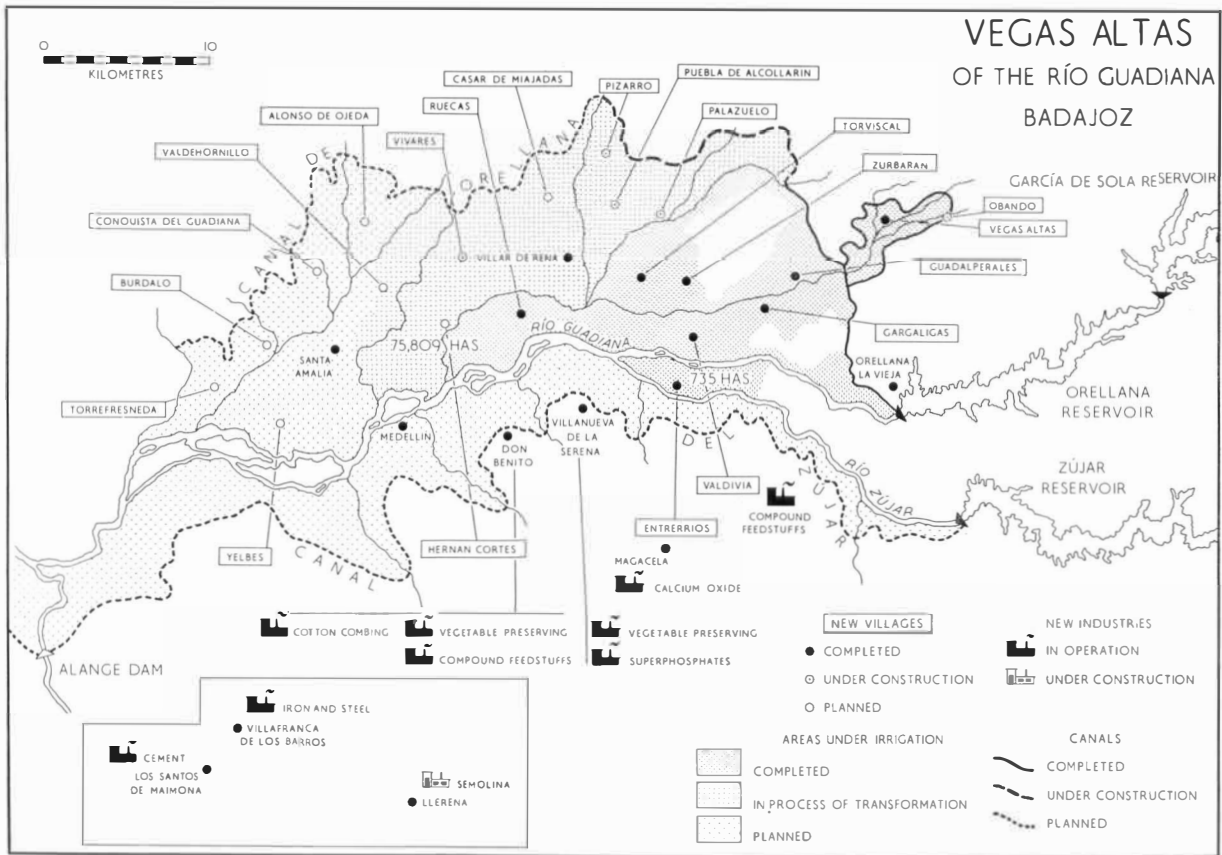


Fig. 3: Progress in the Vegas Altas up to December 31st, 1962

los Montes and Valdecaballeros which have lost their best land under the reservoirs. The programme is accompanied by the provision of new roads and houses for forestry workers. The possibility has been suggested of setting up a National Park around the Cijara reservoir with facilities for tourism and nature reserves.

Apart from this reforestation en masse, extensive planting is being carried out along rivers, roads and canals and around the new settlements throughout the irrigated zone. The problem of disease and plagues is being tackled by the Servicio de Plagas Forestales.

Industrialization

The setting up of new industries in Badajoz is an integral part of the Plan. It is essential that industrialization accompanies agricultural developments, especially in new irrigated zones, in order to provide raw materials e.g., fertilizers, for a more modern agriculture; in order to process, preserve and increase the value of products; to stabilize prices and adequately feed the population; and to make optimum use of untapped natural resources. Increased agricultural production from Spanish irrigated zones is

calling for increased capacity in sugar-refining, meat industries, dairies, textile mills and agricultural residue plant. Any plans which do not make such provision are courting partial failure. In Badajoz, private enterprise is being encouraged to invest in this sector through government incentives and guidance, and a capital inversion of 1000 million pesetas is envisaged. In addition, the Instituto Nacional de Industria is investing 275 million pesetas in plant considered to be of importance to the execution of the Plan. The development programme originally envisaged a total of 96 new enterprises, but this figure has now been modified. Figs. 2 and 3 show the location of existing and projected factories.

Four types of industry are being established:

- Agricultural products. The new irrigated areas are producing many plants which call for processing industries. The most important of these are textile fibres, which occupy 30 per cent of the area under irrigation. In the last 50 years, and especially since 1946, the extension of irrigation in Spain has been mainly associated with the cultivation of sugar beet; but the Badajoz zone is an exception to this rule, with beet cultivation discontinued in favour of textile plants such as cotton, hemp, flax and kenaf. Industries based on cotton include factories for combing, spinning and weaving, and obtaining oil and cattle-cake from seed. Three factories spin-

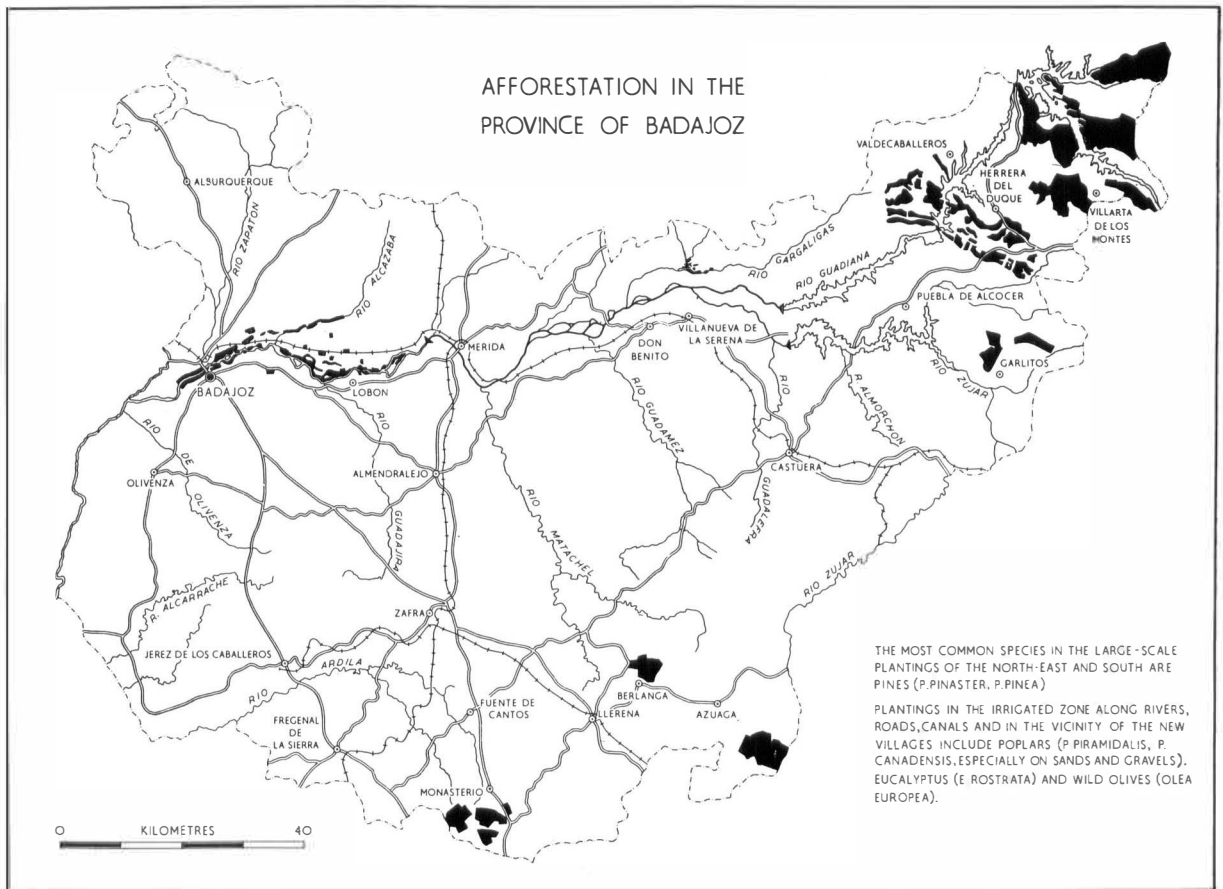


Fig. 4: Main areas of reforestation in the province of Badajoz

ning hemp and flax are functioning in the Vegas Bajas and five more are planned for the Vegas Altas, each with a capacity of 3–4000 metric tons per year. Altogether, 19 new plants will be based on cotton, hemp and flax.

With 2–3 horticultural crops per year being produced, the irrigated zone needs preserving factories to stabilize and guarantee sales and prices on home and foreign markets; four factories with a total capacity of 56,875 metric tons are now operating. So far the products treated have been mainly tomatoes and peppers (used for stuffing export olives) but attention is being directed to the processing of peas, asparagus, strawberries and other fruits.

Livestock have turned out to be one of the most reliable bases of new irrigation practice; they call for the production of considerable quantities of compound feedstuffs. Three plants are now working on the basis of dehydrated alfalfa; the plant at Guadiana del Caudillo produces 7000 tons of fodder per year and that at Don Benito will eventually produce 12,000 tons. Additionally, forage crops occupy 15 per cent of each holding.

The large-scale growing of tobacco has led to the widespread distribution of drying plant and the setting up of fermentation and selection centres in Mérida and Don Benito.

- b) Livestock products. Badajoz is rich in cattle, sheep and pigs, and the irrigated zones, with their dairy cattle

and fodder production, are making the role of livestock more important. Unfortunately, the province is far from the main consuming centres, which explains the existence in Mérida of the biggest slaughterhouse in Spain, sending carcasses and derivatives as far away as Barcelona. The annual production of stock for slaughtering in Badajoz and Cáceres is 2 million sheep, 310,000 pigs and 115,000 cattle, plus 30 per cent as much again from the neighbouring provinces of Sevilla, Córdoba, Ciudad Real and Salamanca. Before the Plan the Mérida slaughterhouse had a capacity for 250,000 sheep, 50,000 pigs and 15,000 cattle per year; at present it is handling some 500,000 sheep, 150,000 pigs and 50,000 cattle – and these numbers will probably go up by another 50 per cent when the Plan is completed. One should also bear in mind the increased quantities of birds and eggs (about 300,000 birds and 672 million eggs) which will be coming from the irrigated zone, seeking distant markets.

The amplification of the Mérida slaughterhouse therefore includes the provision of very large refrigerating capacity, and will stabilize the livestock economy of Extremadura, counteracting the general insecurity of prices and lack of storage space at times of over-production. The setting up of derivative industries within the slaughterhouse, using blood, fat, tails and gelatine, will help to make this plant probably the most outstanding industrial element in the Plan.

By 1967 milk production will rise to some 50 million litres per year, and to help to cope with this production the Co-operativa de Productores de Badajoz (consisting of the colonists and stockbreeders of the area around the provincial capital and the western part of the Vegas Bajas), with the financial assistance of the I. N. C., have set up a dairy in Badajoz with a capacity for processing 7,665,000 litres per year. There are plans for other factories on this model.

- c) Industries auxiliary to the Plan. This group of industries has been created to supply items such as building materials for the public works and settlement schemes and chemical fertilizers for the irrigation zones. For instance, as far as cement is concerned, none whatever was produced in Badajoz at the beginning of the Plan; to satisfy a demand of roughly 100,000 tons per year the new factory of the Sociedad Asland at Los Santos de Maimona began work in 1956. Brick and tile works have also expanded.

In the field of chemical fertilizers the Proquiber works in Villanueva de la Serena has increased production of superphosphates to 50,000 tons per year, and a further 10,000 tons is expected from the new S. I. A. S. A. factory planned at Mérida. Calcium oxide is needed in great quantities in the irrigated zones; two factories at La Garrovilla (serving the Vegas Bajas) and Magacela (Vegas Altas) each have a capacity of 15,000 tons per year.

- d) Industries utilizing other resources of the province. In the agricultural field the Plan confines its attention more or less to the Vegas of the Guadiana. In the industrial sector it hopes to reach beyond the irrigated zones, seeking the greater utilization of the resources of the whole province. The Vegas of the Guadiana were visualized in the Plan as "poles of growth" – centres of attraction and expansion which would stimulate other industries and activities, and create attitudes of imitation, enterprise and innovation in the population of the rest of Badajoz. But while progress in industrialization in the Vegas has been satisfactory, closely following the agricultural transformation, results have so far been negligible elsewhere.

Events seem to confirm Spanish experience that to leave any element of a development plan to private initiative, rather than provide and plan for it specifically, is to court failure. Private capital has not been forthcoming on the scale expected. Private initiative in a markedly agricultural and livestock region has continued to pay more attention to these sectors, and an adverse role has been played by vested interests in other regions which might be damaged by a change in the situation. To the lack of industrial tradition in Badajoz and ignorance of the techniques required for industrialization must be added the generally unfavourable home market conditions and import difficulties experienced by Spain as a whole, up to recently.

It is useful, however, to review the lines along which development has been attempted over the 2 million hectares which lie outside the irrigated zone. As the dry-farming areas of Badajoz lose some of their excess population, there will be room for increased efficiency and production on cultivated land and more intelligent stock-rearing on unsuitable land now used for arable. The province has 200,000 hectares under wheat, 125,000 hectares under barley and 4,000 hectares under rye; the Plan envisaged industries producing cellulose, cartons, biscuits, pastes

and semolina from these cereals. So far the cellulose and biscuits projects have come to nothing. A factory is planned at Mérida to produce cellulose from agricultural residue (olive and grape pulp, cotton, maize and vine stalks) but has been held up to await results from the similar factory being built under the Jaén Plan. A small paste and semolina factory is being constructed at Llerena. More encouraging has been the setting up of two breweries in Mérida.

There is room also for more slaughterhouses, leather factories and woolwashing plants. Badajoz produces about 4 million kgs. of wool per year, used in industries outside the province, and a wool-washing centre would greatly reduce transport costs since the difference in weight between clean and dirty wool is about 50 per cent. But although the project has been officially approved, both a producers' co-operative and the provincial Cámara Sindical Agraria have failed for lack of capital. Because of the potential importance of this project and the leather-cutting industry, it is likely that they will at some time be set up within the Mérida slaughterhouse complex.

Turning to forestry industries, charcoal-burning has always been important in Badajoz, processing 300,000 tons of evergreen and cork oak per year, but the demand for charcoal is falling off and in any case the process is very wasteful, losing a whole range of possible by-products. A new carbonization process envisaged in the Plan would obtain from the same volume of wood 100,000 tons of charcoal and 25,000 tons of tars, which if fractionated would produce 3,000 tons of light oils, 8,000 tons of fuel oil and 12,000 tons of pitch, with the possibility also of obtaining 10,000 tons of acetic acid. However, though private interests at first took up the idea and a company was formed, this project is at present abandoned.

Badajoz also produces 132,000 quintals of cork per year, in the past partly used in small establishments for bottle stoppers, drinking flasks and sheet, but mainly boiled, pressed and baled for export to other provinces and abroad. A factory in Mérida has now been enlarged to process 50 per cent of cork production and ideally the whole of provincial output would be processed in Badajoz, but stumbling-blocks are again the lack of initiative and existing commercial agreements based on the export of raw cork.

The Ministry of Industry has prepared a programme of investigation into mining possibilities, especially for coal and iron, but the Plan itself does not provide for any installations. Private interests have set up a small iron and steel works (Forjas y Aceros del Guadiana) in Villafranca de los Barros which currently produces 1,350,000 kgs. of cast iron bars and 6,300,000 kgs. of converter steel per year, but otherwise mining and metallurgical developments are not promising. It was hoped that improvements to the Zafra-Huelva railway and to the port installations at Huelva might encourage mining for export, but though in recent years more mining concessions have been granted, output remains paltry – lead 3,000 tons per year (from the Azuaga mines), wolfram

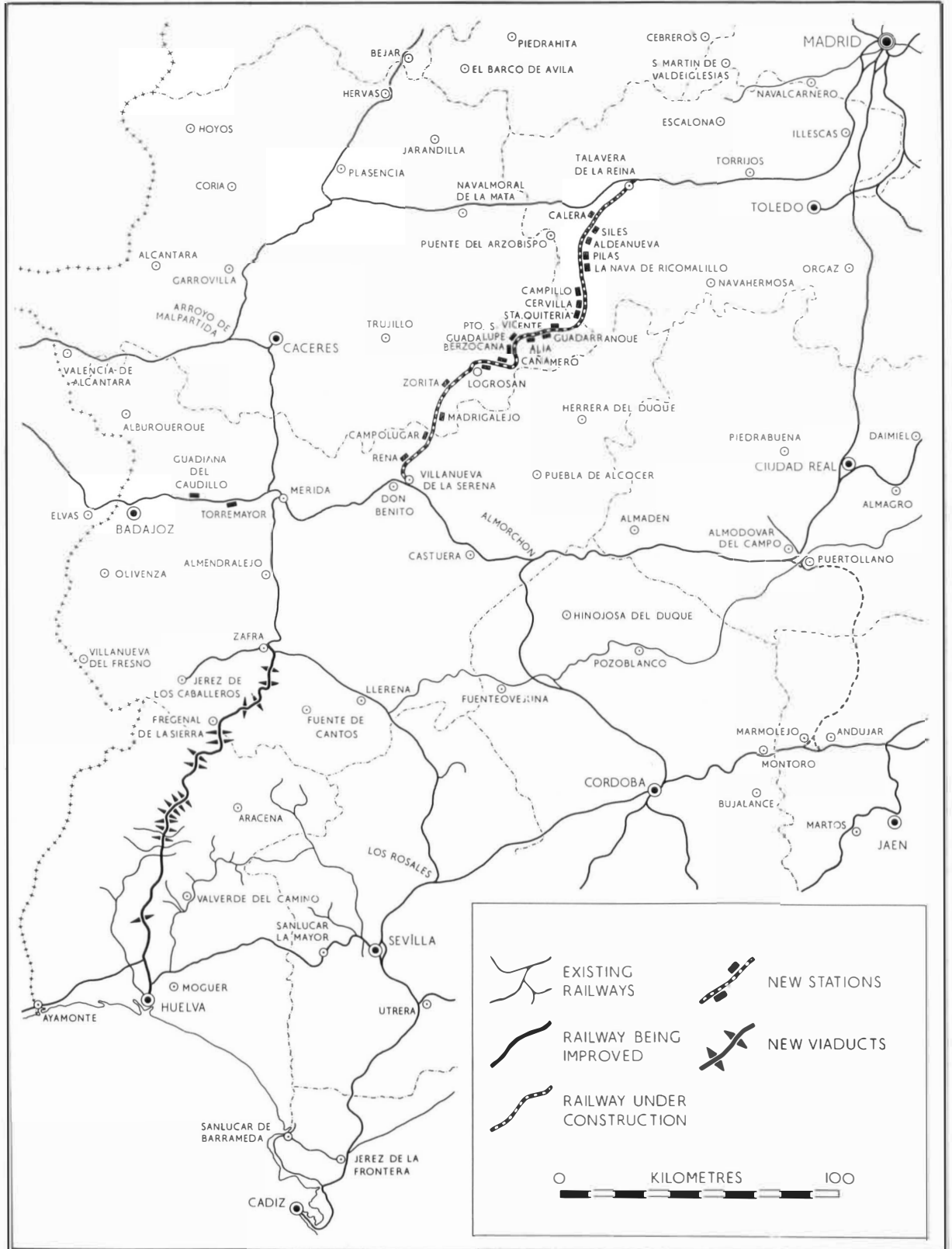


Fig. 5: Improvements to the railway network of southwest Spain

100 tons, kaolin 800 tons, tin 40 tons. Copper, mercury, vanadium and uranium workings have all ceased to operate.

The 20,000 tons of coal per year produced by the Fuentes del Arco mines are of poor quality, with a high ash content. Iron ore deposits vary in richness; there are some magnetites with an iron content of up to 68 per cent and with little phosphorus or sulphur, haematites of 55–60 per cent iron content and little silica, and rich carbonaceous ores; but other deposits are either highly siliceous or increase in sulphur content as mining goes deeper; even the pure magnetites are often uneconomic to work because of limited extent, high extraction costs and bad transport conditions. The Departamento de Pequeña Siderurgia of the Industrial Institute has made some studies with a view to utilizing the magnetites, but as yet no concrete results have been obtained. Iron ore production is thus no more than 200,000 tons per year and shows a tendency to fall further because of the general drop in world prices and the failure of Germany and other foreign countries to place new contracts.

The limestone, quartzite, granite and slate quarries elsewhere at work are not usually great employers of labour.

Expansion of communications

If only to provide an outlet for increased agricultural production (1,260,000 tons per year) the road and rail network of Badajoz needs great improvement. By the end of 1962 297 kms. of new road had been constructed and 49 kms. were in course of construction, especially along the Vegas, and 303 kms. of existing road had been improved.

In railway expansion the most important element is the construction of a new 168 km. line from Villanueva de la Serena to Talavera de la Reina, linking up the irrigated zone to the central Spanish system and shortening the run to Madrid by 78 kms. So far 57 kms. have been completed, from Villanueva to Logrosán. The 180 km. line from Zafra to Huelva has been reconditioned and 16 concrete viaducts have been built to replace earlier metal ones. Altogether, 21 new stations are being built (Fig. 5).

Developments in the port of Huelva, the natural outlet for Badajoz, were completed in 1962, including improved handling equipment and enlarged sidings and warehouses. Badajoz mainly imports fuel and fertilizers through Huelva and exports minerals.

Electrification

The Plan envisages a rise in demand for electricity, from new industries, mines, farms, the new villages and irrigation practice, from 19 to 105 million kwh. per year. Hydro-electricity production from the Cijara, García de Sola, Orellana and Zújar dams is expected to reach 250 million kwh/year eventually. Production began at Cijara in 1956 and in 1960 this installation alone produced 109.3 million kwh., an excess of 15.3 million kwh. over the total consumption of the province. The electricity station at Orellana began producing in 1961, that at García de Sola

is under construction, and the Zújar installation is still in the planning stage (Fig. 6).

These hydraulic stations are operated by a newly-formed concessionary company, the Sociedad Saltos del Guadiana. The extension of the distribution network and its connection with the national grid has been left in the hands of the Compañía Sevillana de Electricidad, operating in the west and centre of the province, and Fuerzas Eléctricas del Oeste, supplying the eastern sector. Details of the new system, of which the main axis is the 132 K.V. Cijara - Mérida line, can be seen in Fig. 6. The new network permits an interchange of energy between the northern, central and southern producing zones of Spain.

By 1962 the electrification of all the towns and villages of Badajoz, including the provision of telephones, had been completed.

Progress so far

An encouraging feature of the Badajoz Plan is the speed with which it is being carried out. The following table summarises some of the results obtained by the end of 1962:

	Completed:	Under construction:	Planned:
Dams	3	1	1
Canals (kms.)	2,049	763	2,642
Villages	25	7	17
Houses	4,970	894	7,928
Reafforestation (has.)	35,398		
Factories	31	3	2
New roads (kms.)	297	49	81
New railways (kms.)	57	86	25
Electricity stations	2	1	2

By the same date 46,697 hectares had been irrigated and 25,030 hectares were in process of transformation; the increase in value of agricultural production from the newly-irrigated land was 5.932 million pesetas.

By the end of 1962 4,379 settlers and their families had been installed in the irrigated zone. An idea of the capacity of irrigated land to absorb surplus population can be seen in the fact that 23,000 labourers were employed in cultivation in the zone, in addition to the colonists proper, whereas a similar area of *secano* would have employed only 3,900. New factories provided employment for 3,400 workers. The actual construction work of the Plan occupied a daily average of 10,000 to 12,000 men, to say nothing of numerous enterprises and their employees also benefitting from the works programme. By December 1962 4,114 million pesetas had been spent on irrigation and colonization.

Encouraging results in production have been revealed by sample studies of settler holdings in the Vegas Bajas. Gross production from the new irrigated holdings is 7.3–8.7 times greater than when the same land was under *secano*, and this bearing in mind that some soils are still in a deficient condition due to levelling operations and that many colonists have not yet had much experience of irrigation techniques.

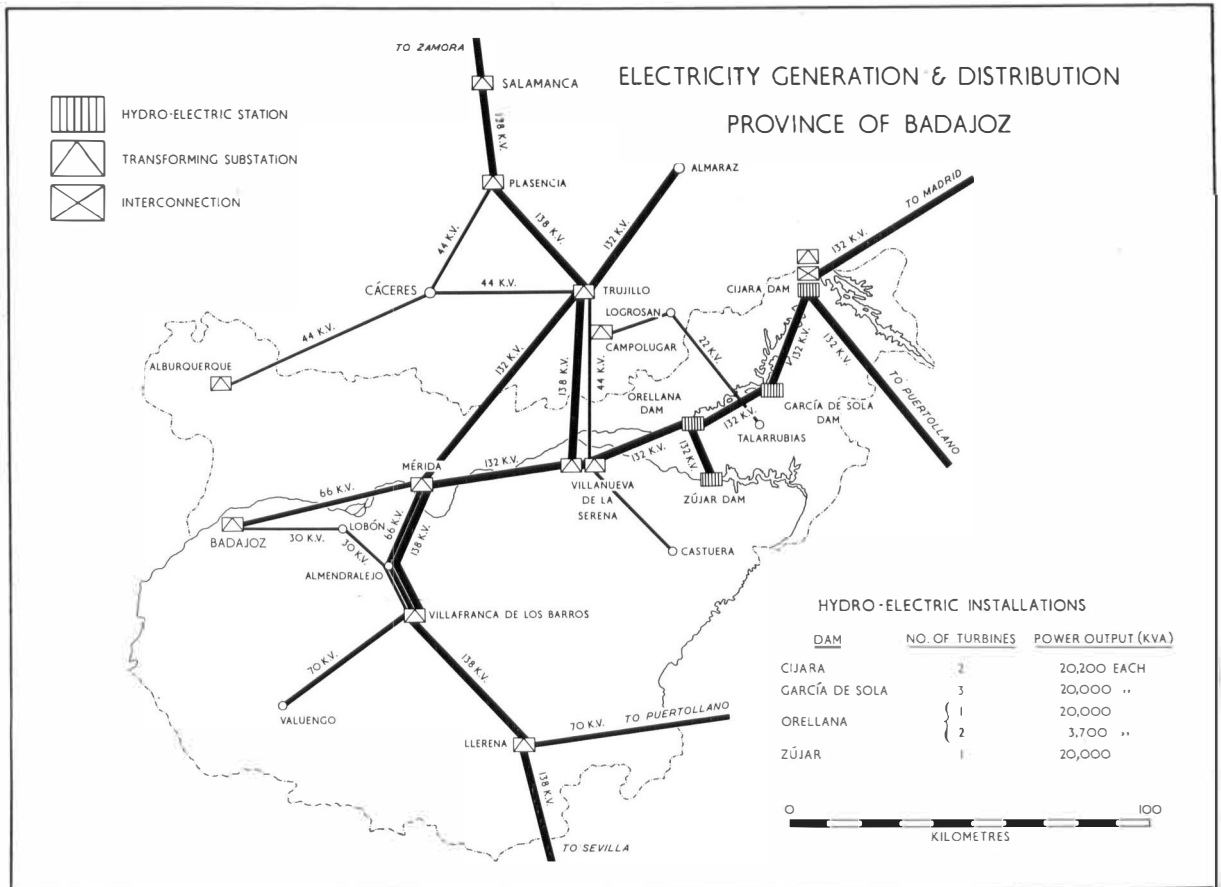


Fig. 6: Hydro-electricity developments in Badajoz up to 1963.

Livestock production has increased even more, partly due to the fact that the colonist has a free hand with it, and also due to the orientation of the Plan, which aims to build up livestock as a source of industrial raw materials. Value of gross livestock production per hectare is over 7,700 pesetas, even from holdings which have only been in operation for 4 years, whereas on the former cattle-rearing *novilleros* of the Vegas Bajas it did not reach 3,000 pesetas. In the first four years of operation of the I.N.C. holdings, net production from the land increased by 114 per cent per hectare and the productivity of labour by 85 per cent; costs rose only by 25 per cent. The setting up of factories processing agricultural produce has made a big difference to the value of crops; thus the value of horticultural products, mainly tomatoes and peppers, increased by 285.23 per cent between 1953 and 1956 as a result of their passing through conserving factories; similarly, the cotton crop increased in value by 155.29 per cent.

The further repercussions of these developments may be seen in such details as that the I.N.C. colonists have bought 8–10 times more industrial products for their farms than is customary under *secano*, and the pattern of personal spending has been similar.

Final results of the Plan

Whereas in 1956 Extremadura had the lowest proportion of land under irrigation of all Spanish regions, Badajoz and Cáceres will eventually be among the 9 provinces with over 100,000 hectares irrigated (the others are Lérida, Valencia, Zaragoza, Huesca, Sevilla, Granada and Alicante). By 1967 the Plan hopes to have created 70,000 new jobs (57,500 in agriculture, 5,360 in industry and 7,140 in service activities), apart from other employment which may arise from the snow-balling effects of the development programme. This represents an increase of 460 million pesetas earned in wages in the province, a rise of 23.02 per cent over 1952. The *yunteros* and casual labourers remaining (20,000 and 30,000 respectively) should be adequately accommodated in the rest of Badajoz.

The value of increased production from the irrigated zone will represent a rise of 38 per cent in total provincial income and a rise of 87 per cent in agricultural income i.e., the value of the crops which will ultimately be obtained from the Vegas alone will be almost equal to the total value of crop production in Badajoz prior to the Plan. The effect is as though another province had been added to

Spain. By 1967 the total increase in provincial income from all sectors of the Plan (agriculture, livestock, forestry, industry of all kinds) should be 76.8 per cent over 1950. The State hopes to have recouped all its outlay on the Plan by 1976, and thereafter should benefit to the sum of 290 million pesetas per year from the transformation.

While the Plan refers particularly to the Vegas of the Guadiana, where most of its fruits can be seen, its radius of action extends throughout the rest of Badajoz. The example of the I.N.C. has stimulated agricultural improvements in the private sphere such as mechanization, the creation of co-operative societies, and trials of new crops and new strains of livestock. Soil studies of the province are under way, better grain-milling and storage facilities are being provided, and wider credit facilities made available. Living conditions in general are improving. Before the Plan there were 69 *pueblos* in Badajoz with water supplies of less than 25 litres per inhabitant per day, and 31 with no water supply at all; 124 *pueblos* had no drainage system. Urbanization programmes are now constructing and repairing local roads, streets and bridges, and providing town halls, clinics, water supplies and telephones. New schools and public libraries are part of the campaign against illiteracy.

When the Plan is completed its effects will reach beyond Badajoz and considerably affect the national economy. A new market for goods and services will have been created in place of the previous vacuum in buying-power. Sugar, meat, milk and textiles are already entering the national market and vegetables and fruit are finding export markets. The Vegas are also providing raw materials and lessening the need for imports of items such as fibres; in round figures, by 1967 the irrigation areas should be producing 1.5 million metric quintals/year of cotton, almost 8.5 million m.q. of flax, 10 million m.q. of hemp and over 11 million m.q. of kenaf.

General comments on the Plan

Some charges of incompleteness of planning can perhaps still be levelled at the Badajoz programme, as we have seen in the sphere of industry. In avoiding the question of the reform of *secano*, the Plan appears to dodge one of the fundamental problems of southern Spain. The colonization of irrigated land can make agrarian problems less severe but not remove them entirely; when the Plan is completed, *regadío* will still only represent one-tenth of the total cultivated land of Badajoz and dry-farming property and practice will still dominate provincial life. On the other hand, one should bear in mind that the Plan is only a prototype, the first major Spanish study of its kind. One might be able to think of a more ample solution to the problems of Badajoz, but hardly one which would solve everything in the space of 14 years. Difficulties of such magnitude can only be tackled in the first instance by massive State intervention to break the vicious circle; and here the Badajoz Plan is certainly making a break-through in terms of social structure and providing an effective infra-structure for later developments.

The Plan demonstrates clearly that it is not enough for the State to provide financial inducements for development. Society itself must will the transformation. There is room for much more private initiative than has been shown. A lead could be given, as it has been elsewhere e.g., in Murcia, by a research institute of Badajoz people themselves, investigating the problems and resources of their province – perhaps a revival of the old Centro de Estudios Extremeños.

Irrigation and colonization may seem a costly way of solving problems; the International Bank for Reconstruction and Development has said as much in its 1963 Report. But from the Spanish point of view this is not just a crash programme – it is a basic revolution, and its costs per capita of worker employed should be seen in the same light as those of constructing blast-furnaces or thermal-electric stations. High investment costs in agriculture are in any event characteristic of advanced economies; one needs almost double the investment one would require to obtain the same returns from industry. Furthermore, Spanish colonization policy is not just economic but social and political in its aims; if it were economics alone which were to rule agriculture, then large areas of the Spanish countryside would have been abandoned long ago. Certainly, if one wants returns from the money invested in land reform and development, these are best obtained from irrigation – quite apart from all the social benefits which irrigation brings through its suitability for family farming.

Finally, one can see in the Badajoz Plan a new concept of “economic regionalism”. Fortunately, the province is not only an administrative area but also a satisfactory socio-economic region, with a homogenous structure and susceptible of coherent growth; there are several such in that great belt of minimal agricultural and industrial development which stretches from the middle Ebro through the Meseta to Extremadura. The integration of these regions into national life is indispensable if Spain herself is to be integrated into international organizations. The Badajoz Plan can be seen, therefore, as a valuable preparation for the first National Plan for Economic and Social Development of 1964 and for Spain’s closer association with the rest of Europe.

References:

- ADELA GIL CRESPO, Colonización y transformación de paisaje agrario de las Vegas de Guadiana. Géographie et Histoires Agraires. Nancy 1959.
- La nouvelle fabrique d’acide sulpharique de Huelva. L’information Géog. Année 28. Jan.-Feb. 1964. p. 37.
- MANUEL PAZOS GIL, “Estado actual y perspectivas del regadío en España”, Revista de Estudios Agro-Sociales, No. 19 (April-June 1957), pp. 17-40.
- LEOPOLDO RIDRUEJO RUIZ ZORRILLA, “Actualidad de los riegos en España”, *ibid.*, No. 31 (April-June 1960), pp. 7-66.
- A. H. H. VAN LIER, “Internal Colonization in Spain”, Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap, No. 4, 1957, pp. 518-532.
- J.-F. GUILLAUD, “Rôle de l’Institut National de Colonisation dans la mise en valeur agricole et hydro-agricole de l’Espagne”, Revue de Géographie Alpine, Tome L, No. 4 (1962), pp. 577-601.

- EMILIO GOMEZ AYAU, "El papel del Estado en las grandes obras de transformación agraria", *Revista de Estudios Agro-Sociales*, No. 4 (July-September 1953), pp. 37-67.
- MANUEL MARTIN LOBO, "Realidad y perspectiva de la planificación Regional en España", *ibid.*, No. 33 (October-December 1960), pp. 85-128 and No. 34 (January-March 1961), pp. 91-126.
- Secretaría-General para la Ordenación Económico-Social*, Madrid, 1948, Programa de Necesidades de la Provincia de Badajoz.
- Secretaría de la Junta Provincial de Ordenación Económico-Social*, Badajoz, 1948, Plan General para la Ordenación Económico-Social de Badajoz.
- RAMIRO CAMPOS NORDMANN, "Notas sobre la planificación económica-social de Badajoz", *Revista de Estudios Agro-Sociales*, No. 14 (January-March 1956), pp. 69-112.
- , "La problemática económica de Badajoz y su solución", *Información Comercial Española*, No. 247.
- , "El Plan de Obras de Badajoz, su justificación y fundamentales fines", *Balance*, Año II, Nos. 33, 34.
- FRANCISCO LOPEZ SANTAMARIA, "El Plan Badajoz: Antecedentes, Contenido y Ensayo sobre sus Efectos", *Revista de Estudios Agro-Sociales*, No. 6 (January-March 1954), pp. 45-82.
- MANUEL MARTIN LOBO, "Una formidable obra conjunta de la ingeniería civil española: El plan de Badajoz", *Boletín de Ingenieros Civiles de España*, No. 12 (January-February 1955).
- , "El Plan de Badajoz es técnicamente perfecto", *Información Comercial Española*, No. 247.
- LUIS GARCIA DE DIEGO, "El Plan de Badajoz. Una realidad transcendental para la economía española", *Piel de España*, Nos. 6-7 and 8 (July-August and September 1956).
- EUGENIO MARIA RECIO, S. J., "Reforma de la estructura económica de la provincia de Badajoz", *Fomento Social*, No. 43 (July-September 1956).
- Boletín de la Asociación Nacional de Ingenieros Agrónomos*, special number, No. 78 (October 1956).
- IGNACIO PUIG, "El Plan de Badajoz", *Ibérica*, Nos. 337-345 (September 1956-January 1957).
- PEDRO DE LORENZO, "Badajoz: Dos co-ordenados para un caballo", *Piel de España*, Nos. 6-7 (July-August 1956).
- ARTURO PEREZ CAMARERO, "Cifras fundamentales del Plan Badajoz", *Revista de Estudios de la Vida Local*, No. 97 (January-February 1958), pp. 75-83.
- E. MARTIN MARTIN, "Un gran esfuerzo para un gran fin: la transformación agrícola e industrial de Badajoz", *Información Comercial Española*, No. 234.
- , "El Plan de Badajoz", *ibid.*, No. 247.
- J. GONZALES PAEZ, "Badajoz y su plan de desarrollo económico", *Balance*, Año II, No. 38.
- Instituto Nacional de Industria, Secretaría Gestora del Plan Badajoz*, Madrid, 1958, El Plan de Badajoz.
- , Madrid, 1960, El Plan de Badajoz.
- Numerous articles in the newspaper "Hoy"*, Badajoz, especially the special supplement of May, 1959.
- JAMES J. PARSONS, "The acorn-hog economy of the woodlands of southwestern Spain", *Geographical Review*, Vol. LII, No. 2 (April 1962), pp. 211-235.
- , "The Cork Oak Forests and the Evolution of the Cork Industry in Southern Spain and Portugal", *Economic Geography*, Vol. 38, No. 3 (July 1962), pp. 195-214.
- C. DE LA SOTILLA AZNAR, "Financiación del Plan de Badajoz", *Información Comercial Española*, No. 247.
- FRANCISCO HERNANDEZ PACHECO, Badajoz, 1956, Características geográficas y geológicas de las Vegas del Guadiana (Zona de regadío).
- J. P. MARTINEZ SANCHEZ, Huelva, 1955, El Puerto de Huelva y el Plan de Industrialización de Badajoz.
- Instituto Nacional de Industria, Secretaría Gestora del Plan Badajoz*, Madrid, 1963, El Plan de Badajoz, resumen informativo de su situación en fin de 1962.
- JOAQUIN BERGER and DIETER WIENBERG, "Estudio económico de la evolución de la producción agrícola de las Vegas Bajas del Guadiana de 1953 a 1956", *Revista de Estudios Agro-Sociales*, No. 21 (October-December 1957), pp. 21-38.

LITERATURBERICHTE

DAS GEBIET DER OSTSLOWAKISCHEN EISENWERKE

Bericht über ein Sammelwerk slowakischer Geographen *

In der Zeit der Donaunomarchie gehörte die Slowakei zum Königreich Ungarn und war ein reiner Agrarstaat. Auch in den Jahren der Ersten Republik (1918-1939) zeigte die Prager Zentralregierung wenig Interesse an der Industrialisierung des slowakischen Landesteils, so daß im Jahre 1930 der Anteil der in der Industrie und im Handwerk beschäftigten Bevölkerung in den „Historischen Ländern“ (Böhmen, Mähren und der zu der CSR gehörige Teil von Schlesien) 41,4 %, in der Slowakei aber nur 19,1 % betrug. Seit 1948 ist man jedoch bemüht, die wirtschaftliche und soziale Rückständigkeit der Slowakei innerhalb der ČSSR gegenüber den tschechischen Gebietsteilen mit allen Mitteln

* K. IVANIČKA (Red.): *The Geography of the East-Slovakian Ironworks/Geografia rajónu Východoslovenských Železiární* (= Acta geologica et geographica Universitatis Comenianae, Geographica Nr. 4; Textband 428 Seiten mit 20 Beiträgen, 44 Abb., Tab.; Kartenband mit über 80 Ktn.) Bratislava 1964. Haupttexte slowakisch, zu jedem Beitrag eine engl. Zusammenfassung, Schlußartikel slow. und engl.

auszugleichen. Namentlich der dritte Fünfjahresplan (1961-1965) sieht eine verstärkte Förderung der slowakischen „Entwicklungsgebiete“ vor. Bis 1965 soll die Industrieproduktion der Slowakei um 84 % gegenüber dem Stand von 1960 gesteigert werden; diese Steigerungsrate liegt 50 % höher als die für den Gesamtstaat vorgesehene, und der Anteil der Slowakei an der Industrieproduktion der ČSSR wird sich im gleichen Zeitraum von 17,8 % auf fast 21 % erhöhen, nachdem dieser Anteil im Jahre 1949 noch bei 12,2 % lag¹⁾.

Einen besonderen Akzent erhält diese Entwicklung durch den Bau der „Ostslowakischen Eisenwerke“ (Východoslovenské železiarne = VSŽ) unweit Košice (Kaschau), welche nach ihrer Fertigstellung ebenso viel Stahl erzeugen werden wie die drei größten tschechischen Hütten zusammen²⁾.

¹⁾ *Statistisches Bundesamt Wiesbaden* (Ed.): Allgemeine Statistik des Auslandes, Länderberichte Tschechoslowakei 1963, Stuttgart 1964; bes. S. 12 - *Ústřední komise lidové kontroly a statistiky* (Ed.): *Statistická ročenka ČSSR 1964* [Statistisches Jahrbuch der ČSSR 1964], Prag 1964. - Mündl. Mitt. Doz. K. IVANIČKA, Geogr. Inst. d. Univ. Preßburg.

²⁾ A. BEHNKE: Die Slowakei. In: *Geogr. Rundschau* 14 (1962), S. 129-138. - J. VACHEL: Die Slowakei - ein ent-