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GEOGRAPHICAL ASPECTS OF HISPANIC COLONIZATION ON THE NORTHERN FRONTIER OF NEW SPAIN

With 2 figures

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Zusammenfassung: Geographische Aspekte der spanischen Kolonisation im Norden Neuspaniens

Aufgrund der überlieferten Siedlungsdaten wurde zuerst eine Periodisierung der spanischen Kolonisation vorgenommen. Dabei ergab sich ein zunächst sprunghaftes, dann langsames Vorrücken der Siedlungsgrenze nach Norden, das im 17. und 18. Jahrhundert durch regionale Kontraktionen unterbrochen wurde. Ausgangspunkte waren die Stadtgründungen, die sich nach ihrer Rolle im Kolonisationsprozeß in Basen, Zentren und Muttersiedlungen gliedern lassen. Obwohl die gelenkte Kolonisation durch staatliche Institutionen, religiöse Orden und Privatunternehmer dominierte, ging ihr häufig eine spontane Landnahme voraus. Typisch für einige Grenzregionen waren Agglomerationen heterogenen Ursprungs sowie Reihungen oder Schwärme von Siedlungen, denen natürliche, militärische und sozio-ökonomische Gesichtspunkte zugrunde lagen. Sie fanden auch in den physiognomischen Grundzügen der verschiedenen Siedlungstypen ihren Ausdruck.

Abgesehen von der Förderung durch einzelne Konquistadoren, Vizekönige oder Privatunternehmer wurde die Intensivierung der Agrarproduktion durch Angehörige der religiösen Orden vorangetrieben. Aufgrund verstreuter Quellenangaben lassen sich Lage und Ausdehnung sowie vereinzelt auch Produktivität und Absatzmärkte der wichtigsten Anbau- und Viehzuchtgebiete im 18. Jahrhundert rekonstruieren. Die innere Differenzierung der Agrarregionen war durch eine abnehmende Nutzungsintensität von den Siedlungszentren zur Peripherie charakterisiert, die sich allerdings in Bergbaugebieten auch umkehren konnte.

Abschließend werden die vielfältigen Gründe dargelegt, die zur Unterentwicklung der nördlichen Grenzregionen Neuspaniens beigetragen haben.

During the last decades, Hispanic expansion from Central Mexico into the northern parts of New Spain has attracted scholarly attention, manifest in a vast number of publications. The geographical dimensions of this northward movement, however, have been largely neglected. Only a few authors are concerned with related topics, for example settlement patterns or distinct colony types. Moreover, these investigations are limited to selected regions[1]. Therefore, it is time to fill in these gaps, extending the research to all the borderlands and including more topics of geographical interest.

1. *Development of colonization*

First, it seems necessary to reconstruct the main periods of colonization by compiling the years of foundation or abandonment of settlements. Moreover, the points from which these activities started as well as the localities where the colonists settled are of special interest for the reconstruction of regional frontier movement. For the present, the following *periods of colonization* can be established:

1) *1530–1541:* Starting from the capital of Nueva España, the Spanish conquerors pacified Jalisco, following the northwest coast to Sinaloa. At first,

[1] The most important printed sources have been summarized by Gerhard (1972, 1982). Of geographical interest are the publications of Simmons (1969) and Fliedner (1975) on New Mexico, as well as Swann (1982) on Durango.

Guzmán and his adherents founded Espíritu Santo (Guadalajara, 1530?), Culiacan (1530), Compostela (1531), and Espíritu Santo (Chiametla, 1531) to protect the subdued population against Indian raids from the Sierra Madre. Later, Purificación (1533) was added to establish the boundaries of the new possessions against the claims of Cortés and the Audiencia of Mexico. Apparently, this period came to an end with the definite establishment of Guadalajara, in 1541 (Mota Padilla 1973: 55–139; Epistolario de Nueva España 1939–42, II:171–173).

2) *1546–1576:* The silver strike of Zacatecas in 1546 gave a new direction to the Spanish expansion. From this center, the expeditions of Ibarra, Tolosa, Oñate, and other conquerors penetrated the northwestern highlands, discovering new mineral deposits. After the founding of San Martín (1562), Nombre de Dios (1563), Durango (1563), and San Sebastián (1567), numerous mines in the north, east and west of Zacatecas were opened (Mota Padilla 1973: 193–208; see Mecham 1968). At the same time, Chichimec attacks affecting the traffic between Mexico and Zacatecas required the establishment of fortified settlements. Apart from a series of shortlived presidios, the settlements of San Miguel (1555), San Felipe (1561), and Celaya (1571) were promoted by the Audiencia of Mexico, those of Lagos (1563), Jérez (1570), Aguascalientes (1575), and León (1576) by the Audiencia of Guadalajara (Powell 1944: 191; 1969: 66–69; 141–157).

3) *1577–1610:* The constitution of Nueva Vizcaya with its capital at Durango paved the way for a new advance of the settlement frontier. In the northwest, Ibarra's men refounded Carapoa which was later moved to the site of San Felipe Sinaloa (1583). In the north, the expedition of Oñate set off from Santa Barbara to Nuevo Mexico, where San Gabriel (1599) and Sante Fé (1610) were the first permanent settlements (Hammond a. Rey 1953,II: 639, 1087; Alegre, 1956–60,I: 358). In the northeast, del Canto and his adherents founded Saltillo (1577) which became the base for the colonization of the Laguna region with Tlaxcalan settlers. In 1596, inhabitants from Saltillo resettled Monterrey constituting the capital of Nuevo León. At the same time, the Jesuit college of Guadiana founded missions among the Tepehuanes (1597) and in Parras (1598) (Historia de Nuevo León 1961: 31, 93f., 137; Alegre 1956–60,I: 468; II: 42, 57).

4) *1619–1680:* After the boom in the 16th and early 17th centuries, the founding of towns declined. In the northwest, the Jesuits christianized Sonora (1619) starting from their headquarters in San Felipe. The bonanza in Parral (1631) gave birth to a new mining center competing with Zacatecas. In the northeast, Franciscan friars established missions on the Rio Grande del Norte (1659) and in Coahuila (1674). Due to various Indian uprisings, the number of presidios was enlarged (Moorhead 1975: 15–18; Alessio Robles 1938: 217–236). Despite these measures, the Pueblo Revolt of 1680 wiped out the Spaniards who retreated to El Paso. Additionally, several missions in northern Nueva Vizcaya had to be deserted, reinforcing the contraction of the frontier in the north.

5) *1683–1722:* These failures incited the Spaniards to new efforts. Several presidios were erected which served as bases for the reoccupation of Nuevo Mexico in 1693. Starting from El Paso, Vargas and his men resettled Santa Fé which itself supplied settlers for the foundation of Santa Cruz (1695) and Albuquerque (1706) (Jones 1980–81: 13f.). With the establishment of Monclova in 1689, the Spaniards created a new base for the reoccupation of eastern Texas. Recruiting settlers, probably from Coahuila, the expeditions of Ramón, Alarcón, and Aguayo erected the presidios of Dolores (1716), Bejar (1718), Adaes (1721), and La Bahía (1722) to stop French invasion (Jones 1980–81: 16, 17; cf. Moorhead 1975: 29f.). These events were accompanied by an extended mission colonization, promoted by the Franciscan colleges of Zacatecas and Querétaro. In the northwest, the Jesuits, starting from Sonora, founded Loreto (1697) which served as focal point for the christianization of Baja California (Clavijero 1970: 91f.).

6) *1731–1768?:* The following years are characterized by opposing directions of frontier movement. On the one hand, the increased Indian raids on the northern and northwestern borderlands caused substantial losses of population. By 1768, between 38 and 87 percent of the settlements in Sonora were deserted, provoking the reorganization of the presidio line (Ocaranza 1939,II: 323–327; Nentvig 1971: 184.) On the other hand, the northeastern borderlands attracted new settlement activities. In Texas, San Fernando de Bejar (1731) was founded with immigrants from the Canary Islands. Coahuila saw the establishment of Gigedo (1749) and San Fernando de Austria (1753) with settlers from Nuevo León and Río Grande, respectively. The most important movement, however, was initiated by Escandón who founded the large colony of Nuevo Santander between 1748 and 1755, recruiting settlers from Nuevo León, Potosí, Guadalcazar, Querétaro, Río Verde, and the Huaxteca (Estado general 1929–30,I: 47–530; see Alessio Robles 1938: 515, 536).

7) *1769–1810:* Apart from the establishment of several towns in Nuevo Mexico, Coahuila, and

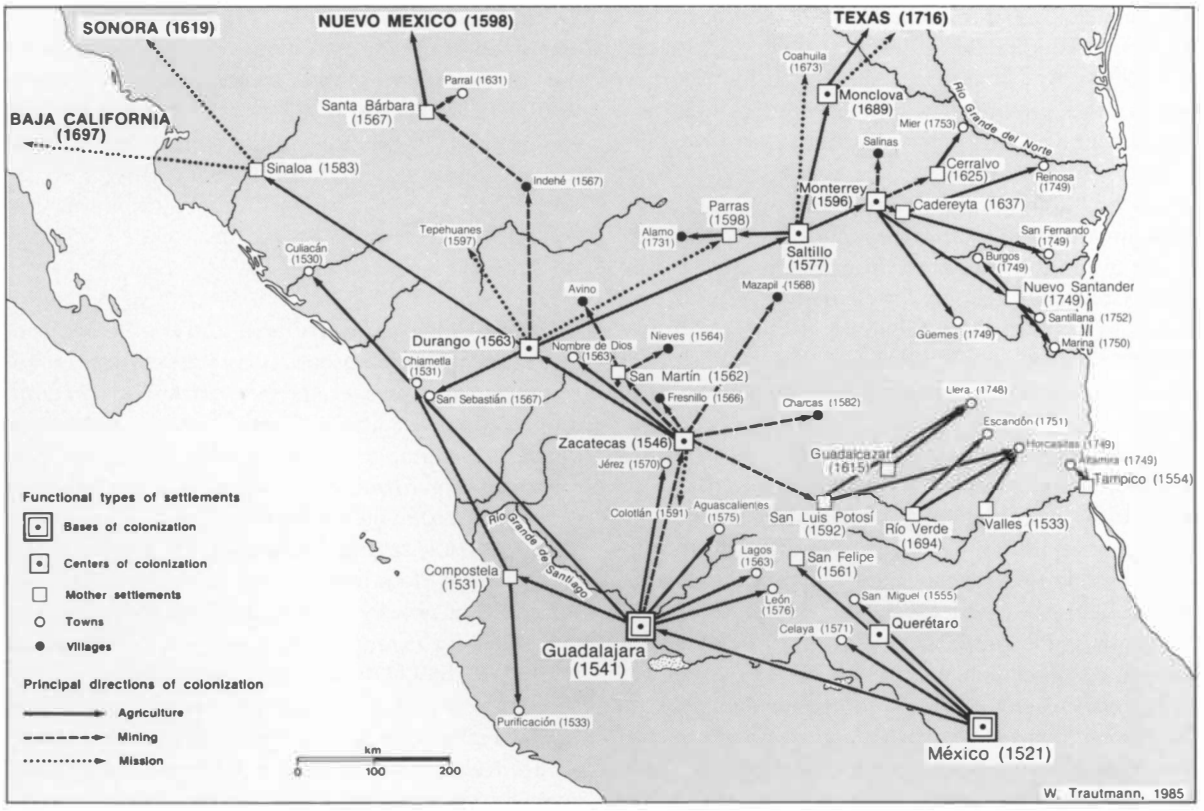

Fig. 1: The development of colonization in northern New Spain
Die Entwicklung der Kolonisation im Norden Neuspaniens

Texas, the principal colonization activities were now directed towards Alta California. First, the presidios of San Diego (1769) and Monterrey (1770) were erected to prevent Russian influence. They also protected the Franciscan friars who founded a chain of missions along the Pacific coast. The expedition of Anza, starting from Horcasitas and Tubac, brought settlers from Jalisco, Sinaloa, and Sonora. San Francisco (1776), San José de Guadalupe (1777), and Los Angeles (1781) were founded with retired soldiers and colonists. Finally, the town of Branciforte (1797) was laid out, attracting landless families from San José and Los Angeles (Garr 1978; see Jones 1980–81: 19f.; Bannon 1970: 162, 164).

When analyzing the spatial expansion of colonization, several common features become apparent. In early colonial times, a leap-frogging of frontier movement prevailed. First, the explored resources were occupied, and only afterwards were the gaps between starting points and outposts filled with settlements. Examples are the founding of Compostela and Guadalajara after the conquest of the northwest coast, the establishment of presidios and towns in the southern highlands after the bonanza at Zacatecas or of the El Paso colony after the occupation of Nuevo Mexico. Later, a slow advance of the frontier characterized by the successive founding of settlements occured. Apparently, this type of frontier movement dominated in regions without great mineral wealth or strategic value. The colonizations of Sonora and Baja California, continuing the northwestward expansion from Nueva Vizcaya, are relevant examples here.

At the beginning, towns, often elevated to cabeceras of borderland regions, played an important role in colonization. They became seats of military, administrative, and ecclesiastical institutions engaged in frontier advance, bases for the equipping of expeditions, and reservoirs for the recruitment of settlers. According to their influence on colonization, the following *hierarchic system* can be established (see fig. 1):

1) *Bases of colonization:* Obviously, the frontier movement was directed from Mexico, and to a minor degree, from Guadalajara. After the Conquest, viceroys and members of the respective Audiencias initiated or supervised the founding of towns which

was later delegated to the authorities of subordinate districts (Torquemada 1969,I: 640; Velázquez 1897-99,I: 28; see Powell 1969: 141-157). These, as well as the provinciales of the different religious orders supported most colonization enterprises.

2) *Centers of colonization:* These represent the focal points of differentiated colonization activities. The most outstanding example is Zacatecas, promoter of the mining and mission frontiers in Nueva Vizcaya, Coahuila, and Texas. Moreover, Querétaro, Durango, Saltillo, Monclova, Monterrey, and perhaps San Felipe served as bases for the establishment of many presidios, missions, mines, and agricultural colonies.

3) *Mother settlements:* These represent the branches of colonization movements which initiated one or more affiliated settlements, mostly of the same type. With respect to mining camps, San Martín, to missions Sinaloa and Loreto, and to agricultural settlements, Santa Fé, Cadereyta, and Santander should be mentioned because they gave rise to several subsequent establishments.

In general, the Spanish Crown or the Viceroy engaged civilians to realize proposed projects of conquest and colonization, granting them ecomiendas, charges, privileges, and titles. They, on the other hand, had to finance the enterprises out of their own funds. In early colonial times, the conqueror Guzmán claimed to have supported the vecinos of Compostela and other towns at his own expense, distributing food, constructing buildings, and opening roads (Epistolario de Nueva España 1939-42,XIV: 183f., 185). Later, rich civilians such as Ibarra, Urdiñola, and Escandón invested their money in colonization expeditions, including the recruitment and payment of settlers, which were only occasionally supported by the Real Hacienda. To reduce the costs, some entrepreneurs transferred their tasks to other persons offering similar favors. (Estado general 1929-30,II: 52, 118, 121; see Historia de Nuevo León 1961: 137). The mission colonization of the Jesuits mainly depended on the gifts of benefactors or the revenues from their own haciendas. The maintenance of friars, churches, and soldiers, however, was supported by the Real Hacienda (Clavijero 1970: 88, 123, 235).

Although the colonization of northern New Spain was principally directed by authorities, religious orders, and private entrepreneurs, unregulated settlement movements also occurred, promoted by civilians who hoped to discover precious metals, to find new agricultural lands and pastures or to escape governmental control. In Nueva Vizcaya and Nuevo León miners from Zacatecas, and in Guanajuato, Sichu, and Nuevo Santander farmers, ranchers, and herdsmen from the adjacent borderlands were among the first explorers and settlers (Estado general 1929-30,II: 114, 130, 138; Morfi 1935: 69; Jiménez Moreno 1958: 75). They often constituted the base for the subsequent establishment of towns.

2. *Settlement patterns*

Due to their extensive area and hostile environment, the northern borderlands were sparsely settled. In some cases, however, deviations from this predominant settlement pattern occurred which can be attributed to profitable natural resources or principles of frontier organization. In this respect, the following *locational arrangements* can be found:

1) *Clusters of settlements:* Apart from mining areas, there existed close associations of one or more missions with a nearby presidio or Spanish town. The most striking examples represent the complexes of La Bahía, San Antonio, El Paso, and Monclova. Associations between Spanish towns and Indian colonies also occurred, as well as between these and reduced Chichimecan tribes. Examples are Monclova, Parras, and Saltillo where the different ethnic groups lived closely together but maintained separate administrations. Although this locational arrangement facilitated mutual assistance in frontier pacification as well as racial mixture, land dispute, which arose not only between Spaniards and Indians, but also between different Indian communities, provoked the abandonment of settlements (Lafora 1939: 170f., 173f., 179; Velázquez 1897-99,III: 37, 43).

2) *Chains of settlements:* Because of the long drought periods in the northern borderlands, a location near water courses became decisive for the establishment of settlements. Furthermore, the fertile alluvial soils of periodically flooded or irrigated plains provided favorable conditions for cultivation. Consequently, colonization was oriented to the main streams instituting loose or compact files of settlements. Examples can be found on the upper and lower Río Grande, in Sinaloa, and especially in Sonora where the Ríos Yaqui, Sonora, and Magdalena as well as their tributaries encouraged the establishment of mission chains, probably reinforcing pre-Hispanic settlement distribution (see the maps in Burrus 1967; Pfefferkorn 1949: 255f.; Alegre 1956-60,II: 288): On the other hand, permanent defense against Indian raids called for the alignment of settlements and the integration of presidios, towns, and haciendas into a frontier line. In the 16th century, the first line was

established along the Camino Real from Mexico to Zacatecas. In the 17th and 18th centuries, the cordon of presidios was pushed farther north, reaching or crossing the present state boundary in the northwest and northeast, respectively (NAVARRO GARCÍA 1964: 351–369; see the maps in MOORHEAD 1975).

3) *Swarms of settlements:* Compared with the clusters of settlements previously described, these were loose associations of many homogeneous settlements which also served as a stronghold for frontier pacification. The best example in this respect is represented by the colony of Nuevo Santander composed of one ciudad, 18 villas, 2 poblaciones, 2 reales de minas, and 2 haciendas (Estado general 1929–30,I: 47–530). Assembled on the eastern foothills of the Sierra Madre and the adjacent coastal plain, with a few outposts on the lower Río Grande, they constituted a barrier against Chichimecan attacks from the Sierra Gorda. At the same time, by stationing garrisons or militias in each town, the traditional concept of presidio defense was abolished, at least in this region of New Spain.

In many areas, the frontier was composed of communities with different economic and social structures. Consequently, they showed distinct *settlement patterns,* although they shared some common features with regard to defense.

1) *Haciendas:* In the late colonial period, their nucleus consisted of the residence of the mostly absent owner, the chapel, the buildings for working supplies, and the living quarters of the peones. Although unregulated clusters of buildings existed, the houses were mainly arranged around a fortified plaza. Exceeding sometimes 2000 residents, a few haciendas were raised to cabeceras of jurisdictions or curatos, like the Hacienda Concepción in the Valparaiso valley (MORFI 1935: 93, 119, 131; LAFORA 1939: 22, 66). The extended properties were in general dotted with the ranchos of tenants or servants who tended fields, herds, charcoal-piles or quarries. Typical for some frontier areas were the swarm-like agglomerations of pastorías, assembling 400 or 500 persons to guard the huge herds (Estado general 1929–30,II: 56, 59; LAFORA 1939: 258f.).

2) *Presidios:* Founded as strongholds against Indian attacks, the garrisons sheltered between 20 and 100 soldiers headed by a captain who also performed the function of gobernador or alcalde mayor. In late colonial times, they also attracted civilian settlers who formed the nucleus of a village or town, after the old presidio had been abolished. Apart from polygonal fortifications, the groundplans of Jalpa, San Antonio, and Los Dolores show a rectangular, walled courtyard with two or more towers on the opposite corners. Besides these, plaza-like or even unregulated clusters of buildings occurred, such as Altar or Terrenate, respectively (see the maps in NAVARRO GARCÍA 1964; MOORHEAD 1975: 222–242). Due to the scarcity of houseplots, many compounds were broken up to construct houses outside the walls.

3) *Missions:* It was the over-all intention of the Jesuit and Franciscan friars to reduce the Indians of dispersed rancherías so that they formed compact, regulated villages, sometimes comprising more than 2000 persons, as in Parras (ALEGRE 1956–60,II: 42). If the lands were not fertile enough to feed the population, the Indians were allowed to stay in their ancient dwellings or to return to their semi-sedentary way of life. In general, the barrios and streets were oriented to the central plaza which was occasionally walled and fortified, as in San José de Aguayo (Texas). The nucleus of the settlement was composed of the church, the monastery containing the obraje and various workshops, the granary, the school as well as the houses of soldiers and christianized Indians. Parts of the extended lands were occupied by ranchos whose inhabitants attended the communal herds (MORFI 1935: 201, 203, 226ff.; Documentos para la historia eclesiástica 1961: 250ff.; REVILLA GIGEDO 1966: 30).

4) *Mining camps:* Apart from a few reales de minas, such as Fresnillo which had about 5000 residents in 1778 (MORFI 1935: 60), these predominantly represented small, unregulated clustérs of buildings inhabited by miners and merchants. Additionally, separate camps of Indian and Negro workers existed. The most characteristic features were, however, the complexes of several stamp mills, furnaces, and amalgamation plants which in Parral lined the banks of the river for a distance of 1 or 2 kilometers (WEST 1949: 26–33). In general, the mines were provided with food and working supplies by the surrounding haciendas and ranchos which were partially owned by the miners themselves. Due to the exhaustion of veins, flooding, lack of laborers, and raids by hostile Indians, many reales de minas were abandoned after a short time, constituting the most instable elements of the settlement frontier.

5) *Agricultural solonies:* The majority of these settlements were concentrated in Nuevo Santander. Although often raised to villas, they seldom possessed any central function. Their residents cultivated gardens and fields, but they were also occupied with livestock raising or serving on nearby haciendas, as in Santillana or Real de Infantes, respectively. For defense, a small garrison was stationed in each colony. Only Aguayo and Santillana had their own

militias. The settlements represented unregulated clusters of huts, predominantly arranged around a central plaza with the church as well as the residences of the missionary and the captain. Only Hoyos seems to have adopted a checkerboard pattern. The lack of any regulation is attributed to the permanent Indian attacks as well as to the poverty of the inhabitants (Estado general 1929–30,II: 61f., 93)[2].

Of special interest is the question of whether any changes of settlement pattern occurred during the colonial period. In the 18th century, many colonists established ranchos outside villas and presidios, reinforcing the dispersion of settlements. Apparently, this movement was provoked by the growing population which reduced the available lands (Estado general 1929–30,II: 103ff., 113; Documentos para la historia eclesiástica 1961: 318; see SIMMONS 1969: 11). On the contrary, tendencies also existed towards concentration originating from different causes. On the one hand, the increasingly frequent Indian raids forced the settlers in some areas to abandon their isolated farmsteads. On the other hand, the increasing population on the haciendas suggested the establishment of independent pueblos, favored by the authorities, but prevented by the hacendados. Nevertheless, it is likely that new settlements with former tenants or peones were founded, at least on the Hacienda Los Hornos in Parras (MORFI 1935: 68, 97, 123; cf. VELÁZQUEZ 1897–99,III: 84–86).

3. *Land use patterns*

The progress of colonization largely depended on the development of agriculture in the borderlands. Conquerors and colonizers promoted cultivation and livestock-raising by introducing seeds and cattle from the Old World as well as by providing the settlers with the necessary equipment. In early colonial times, Guzmán is reported to have supplied the residents of Culiacan and other towns with cattle and agricultural tools as well as to have planted vineyards, gardens, and wheat-fields (Epistolario de Nueva España 1939–42,XIV: 183–186). Later, the expeditions of Zavala, Oñate, and Aguayo carried with them seeds, herds, and the most indispensable implements for colonization.

The promising reports on the natural resources of the conquered regions also induced the State to support agricultural development. Thus, the president of the Second Audiencia, Ramírez de Fuenlal, ordered the introduction of orchards and wheat-fields all over New Spain, initiating himself the cultivation of hemp and flax, whereas Viceroy Mendoza sent cattle to the colonies of Nueva Galicia, relocated estancias from the valleys of Tepeapulco, Tzompanco and Toluca to the plain of Zacatecas and Guadiana, and imported merino sheep from Spain (TORQUEMADA 1969,I: 607, 610f.; MOTA PADILLA 1973: 141).

The importance of the religious orders in agricultural development is widely recognized. They were not only pioneers of vine-, fruit- and vegetable-gardening, but also introduced wheat- and cotton-farming as well as cattle-raising to their missions. Moreover, the friars developed new agricultural methods adapted to the different natural environment, such as for wheat-cultivation in Baja California (BARCO 1973: 115). Their most significant contribution, however, was the construction of aqueducts, canals, and ditches for irrigation, thus intensifying Indian agriculture which largely depended on rainfall or inundation.

In general, the diffusion of agricultural innovations may be attributed to the initiatives of individuals, rather than to the instructions of political or religious institutions. In 1635, sheep-raising in Nuevo León was stimulated by a certain Antonio Leal and his brothers who established the first estancias after their explorations from New Spain. Later, wheat-production was doubled using a variety which was sent by Juan Zuñiga from Guadalcazar. The most outstanding example, however, is José de Escandón, who established a model farm in Santander, not only to supply the colonists with the products of sugar cane, but also to teach them the specific techniques of cultivation (Estado general 1929–30,II: 25; Historia de Nuevo León 1961: 90).

The advance of colonization in northern New Spain also provoked a differentiation in agriculture. The following *cultivation zones* can be distinguished according to the main crops (see fig. 2):

1) *Maize:* From the beginnings of colonization, maize was grown mainly for subsistence. Even cattle ranches reserved small tracts of land for the daily ration of the peones. Due to different conditions of climate and soil, the yields varied extremely in the regions under consideration. Compared to an average ratio of 1:150 fanegas for New Spain, the missions of Nueva California only obtained ratios of 1:70 or 79, whereas the haciendas between San Juan del Río and

[2] Therefore, the view of HENNESSY (1978: 47) that the towns were generally constructed on the grid-iron pattern must be revised.

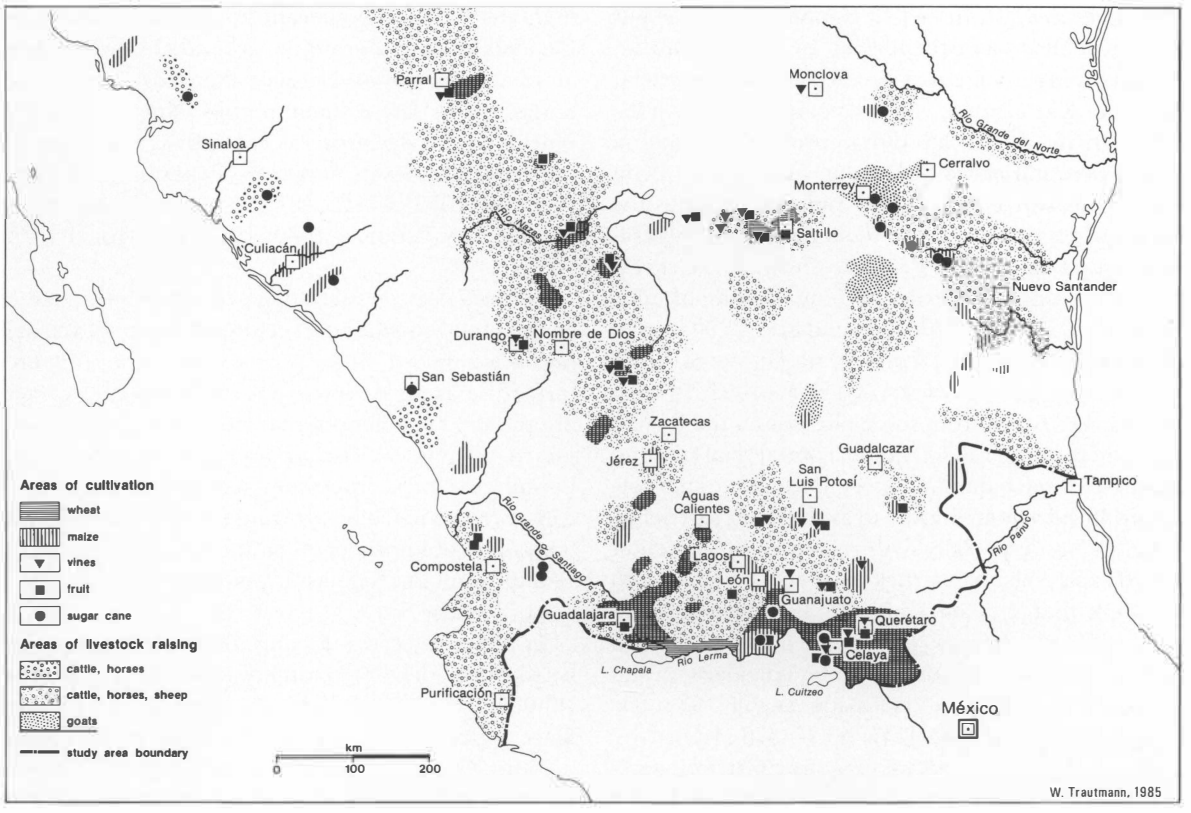

Fig. 2: Land use patterns of northern New Spain in the eighteenth century
Landnutzung im Norden Neuspaniens im 18. Jahrhundert

Querétaro produced 1:300 or 400 fanegas. Among the main production areas, concentrated in the southwestern highlands, Tlaltenango, Lagos, and Léon are mentioned (Humboldt 1966: 250ff; Lázaro de Arregui 1946: 117, 120; see Brading 1978: 65).

2) *Wheat:* In contrast to maize, wheat production was principally market-oriented. To obtain higher prices, many hacendados had established mills on their lands. Although wheat was predominantly irrigated, the yields also differed from region to region according to varying natural conditions. Compared to an average ratio of 1:22 or 25 fanegas for New Spain, the missions of Nueva California achieved ratios of 1:16 or 17, whereas the haciendas between Querétaro and León produced 1:35 or 40 fanegas. Apart from the Bajío, Parras, Monclova, and Saltillo are reported as the main production areas, exporting wheat to Texas, Nuevo León, and Nuevo Santander (Humboldt 1966: 257–259; Ramos Arizpe 1932: 84).

3) *Vines:* Although affected by the monopoly of the motherland, vineyards were planted by many missions, haciendas, and agricultural colonies in Nueva Galicia, Nueva Vizcaya, Coahuila, Nuevo Mexico, and Alta California. Apparently, grapes, wine, and brandy were mainly produced for local consumption, except for Santa María de los Parras and the Hacienda San Lorenzo in the Laguna region, which also exported wine and brandy to other parts of New Spain, as far as Chihuahua, Texas, and Mexico (Morfi 1935: 133, 141f.; see Ladrón de Guevara 1969: 37; Villa-señor y Sánchez 1746–48, II: 410).

4) *Fruit:* Nearly all the settlements possessed orchards with fruit from Europe and New Spain which mainly served for local consumption. Due to the competition from Indian pueblos, only small quantities were delivered to mining camps. Although the growing of many varieties was more common, some areas specialized in a single crop. Thus, nuts were grown in the valley of Poanas, and olives around Celaya. In other areas, the altitude or exposure limited the possibilities of cultivation. Therefore, the miners of San Martín and Zacatecas preferred to grow apple-trees (Mota y Escobar 1940: 177, 184; Lázaro de Arregui 1946: 125f.; Lafora 1939: 42).

5) *Sugar cane:* In the early colonial period, sugar cane haciendas were established in Nueva Galicia, principally in the valleys of Purificación, Compostela, Etzatlan, Río Grande, and Xuchipila (CHEVALIER 1952). In the 17th and 18th centuries, cultivation moved to small areas of Sinaloa and Nuevo León (with centers in Huajuco and Linares). Due to the increased demand in the late colonial period, plantations also arose around Penjamo, Irapuato, Celaya, Salvatierra, and Río Verde, pushing the limit of cultivation up to an altitude of 1800 and even 2200 meters (HUMBOLDT 1966: 285; LADRÓN DE GUEVARA 1969: 17f.; FERNÁNDEZ DE JAUREGUI URRUTIA 1963: 15–20).

6) *Cotton:* Apart from some pueblos on the Pacific coast and the upper Río Grande, commercial farming was limited to Coahuila. The poor quality of the cotton produced was attributed to the lacking experience of the settlers, especially with respect to the selection of seeds and soils. Nevertheless, the yields proved so abundant that they not only supplied the manufacturies of Saltillo, but also the eastern provinces as well as the dioceses of Valladolid and Guadalajara, at the end of the colonial period (RAMOS ARIZPE 1932: 85; VILLA-SEÑOR Y SÁNCHEZ 1746–48,II: 378, 409).

Due to the scarce and varying precipitation, agricultural crops depended heavily on irrigation. Dams built in river beds or norias constructed on wells distributed the water to canals. Moreover, underground galleries collected the water from aquifer layers, following the example of oriental qanats. Although only documentary evidence exists of their installation in Guadalajara and on the Hacienda Buenavista, near Zacatecas, archaeological remains suggest a wider distribution (ALZATE 1831,II: 451; MORFI 1935: 52)[3].

Because of the unfavorable natural conditions, the greater part of the agricultural area was devoted to livestock-raising. In general, the colonists kept large herds with various kinds of livestock. Only a few haciendas specialized in the raising of one or two species.

1) *Large farm animals:* The raising of large animals was often associated with the cultivation of cereals requiring oxen for tilling, mares for threshing, and mules or asses for transport. On the other hand, the miners bought large quantities of animals for consumption and working purposes. Consequently, the main distribution areas were situated in the western highlands with agglomerations of estancias between Guadalajara and Zacatecas, around Durango as well as in the valleys of Trujillo, Palmitos, and Guatimape. In the late colonial period, Nuevo León and Nuevo Santander arose as centers for the export of horses and mules to Veracruz, Coahuila, and Texas (VIGNESS 1972: 474f., 481; REVILLA GIGEDO 1966: 42; MOTA Y ESCOBAR 1940: 173, 201; MORFI 1935: 76f.).

2) *Small farm animals:* Due to the importance of large animal-raising, the keeping of sheep, goats, and pigs was reduced. Since early colonial times, Querétaro arose as major center for sheep-raising, attracting the establishment of many obrajes. Later, it was joined by Nueva Viscaya and Nuevo León which became the most important region for goat-raising concentrated in Cadereyta and Cerralvo as well as in the valleys of Labradores, Santa Catarina, Pesquería Grande, and Las Salinas (LADRÓN DE GUEVARA 1969: 7, 11, 20–23).

In order to secure a constant fodder supply, the herds were driven to different seasonal pastures. While in Nuevo Santander the colonists moved from place to place due to the lack of property boundaries, in other regions a regular transhumance between summer and winter pastures was established. During the dry season, huge flocks of sheep from Queretaro hibernated in the surroundings of Guadalajara, Río Verde, and Horcasitas. Furthermore, the Jesuit missions of California sent their flocks to the Atlantic lowlands, near Aguayo. In 1620, about 2 million foreign sheep grazed in Río Verde, and in 1757, 900,000 in the colony of Nuevo Santander (Estado general 1929–30,II: 25, 59, 77; LÁZARO DE ARREGUI 1946: 65, 114; VÁZQUEZ DE ESPINOSA 1968: 188).

Although the spatial configuration of the production areas seems to have been irregular, a consideration of land-use intensity reveals a regular center-periphery pattern which can be described by a ring model according to the theory of VON THÜNEN. At the core of most locational arrangements, as around Saltillo, intensive land use predominated, characterized by fruit- and vegetable-gardening within and on the outskirts of the towns. It was surrounded by a zone with wheat- and maize- or general-farming. Finally, a zone with extensive livestock-raising followed. With respect to natural conditions, these zones did not always represent concentric rings but also successive segments following the shape of rivers and valleys. In some mining areas without resources for cultivation, such as Zacatecas, an inversion of the zones occurred with ranching in the center and farming further away (see the maps in CHEVALIER 1952 and SWANN 1982).

[3] With respect to the distribution of galerías filtrantes in northern Mexico, see the map in SEELE (1973).

4. Conclusion

Unfortunately, the progress of colonization did not always correspond to the intentions of the State. This may be attributed to various causes. First, the frequent raids by hostile Indians, epidemic diseases, and unfavorable conditions of location, for example heat, scarcity of water or danger of inundation, provoked the movement or abandonment of settlements. Apart from the fact that the settlers lacked seeds, agricultural tools, livestock, and food in the initial stage of colonization, many among them were not familiar with methods of cultivation, being soldiers, herdsmen or vagants (Estado general 1929–30, I: 27; II: 14, 95; NENTVIG 1971: 100f.).

Second, the conflicts between the institutions involved in colonization often paralyzed the development of the borderlands. Apart from disputes about jurisdiction, for example between Mexico, Nueva Galicia, and Nueva Vizcaya about the affiliation of Nombre de Dios, land disputes frequently arose between presidios, missions, agricultural colonies, and haciendas. Especially the latter were held responsible for the decline of settlements, at least in Coahuila (MORFI 1935: 68). Crown and Clergy also held different views on the method of colonization. While the Clergy wanted to augment the number of missions, the Crown preferred the establishment of presidios to stabilize the frontier, supported by the local authorities who feared that the pacification of the Indians would make the presidios unnecessary (LADRÓN DE GUEVARA 1969: 20; Documentos para la historia eclesiástica 1961: 272; MORFI 1935: 68, 182)[4].

Third, the development of the borderland provinces was affected by the small scale of commercial activities. Causes were the long distances as well as the few and predominantly deficient roads, thus raising the costs of transportation. Contemporary observers also criticized the lack of harbors, especially on the Atlantic coast which would have opened the connection of Nuevo Mexico and Nuevo Santander with Havana. The most critical point, however, was the absence of markets. The main trading centers were Mexico and Veracruz, reducing the concentration of commercial activities in northern New Spain to the ferias of Saltillo and Jalapa (VIGNESS 1972: 479–481f.; LAFORA 1939: 101; REVILLA GIGEDO 1966: 72).

Finally, the geographical dispersion of governmental institutions diminished the efficiency of decisions with respect to conquest and colonization. Taking Saltillo in late colonial times as an example, the Gobernador resided in Monclova (60 leguas), the Comandante General in Chihuahua (200 leguas), the Real Audiencia in Guadalajara, the Intendente in San Luis Potosí, and the Junta Superior de Real Hacienda in Mexico (also 200 leguas respectively) (RAMOS ARIZPE 1932: 104f.).

[4] With respect to the conflicts between Crown and Clergy, see TORQUEMADA (1969, I: 605) and LEJARZA (1947).

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