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Change and the Role of Government in Villages of the Jeddah Region

JOHN ADY
Department of Landscape Architecture,
Faculty of Engineering, King Abdulaziz University,
Jeddah, Saudi Arabia.

ABSTRACT. Three oases, of the Jeddah area, are discussed: Wadi Khulais, Haddat ash Sham, and the lower middle Wadi Ghiran. Their historical background, topography and water resources are outlined. The role of the decrease in the quantity and quality of water in their changing patterns of land use is discussed. The resulting government response to this change in the form of the founding of new villages is briefly described.

1. Introduction

This article concerns three of the main oases of the Jeddah region north of Wadi Fatima: Wadi Khulais, Haddat ash Sham and Wadi Ghiran, located on Fig. 1. These were studied in 1985, 1986 and 1987 by student teams from the School of Environmental Design, King Abdulaziz University, whose reports are drawn on in the following account[1-3]. Their main social findings confirm those described in Wadi Fatima by Katakura in the 1970s[4] of the effects of change on traditional ways, but there are significant differences in the way their water regimens have altered and in the subsequent resettlement policies of the government.

Wadi Khulais is 80 kilometers north-northeast of Jeddah (see: Fig. 2 and 3). It is a flood plain of about 15 by 7 kilometers in area. In 1985 its population was at least 9,000 people in six main and over twenty minor villages, many of the latter deserted by their original people, but being partly reused by expatriate laborers. Haddat ash

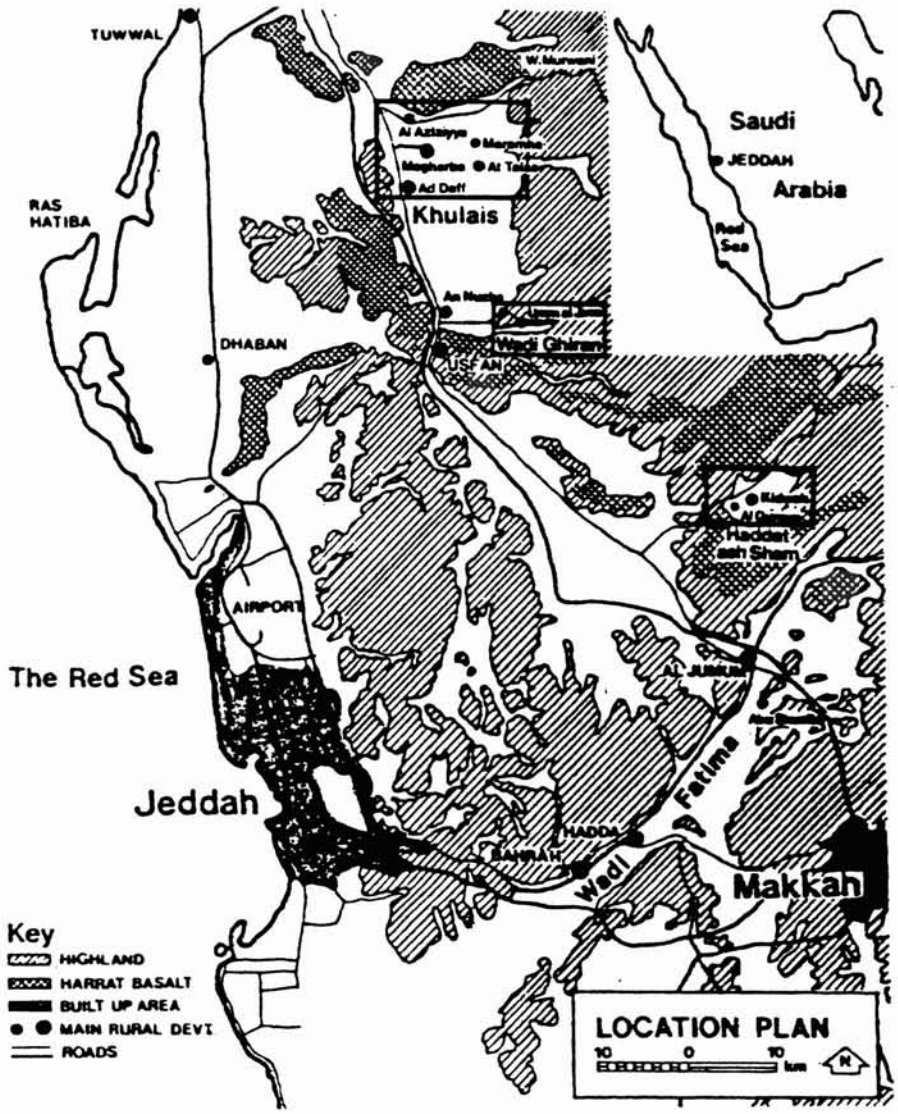

FIG. 1. The location of the three oases discussed. The lava flows dividing the coastal plain are shown.

Sham is 60 kilometers east-northeast of Jeddah (105 kilometers by road, see: Fig. 4), a secluded valley about 10 kilometers long by 5 across. In 1986 there were about 2,500 inhabitants in four main and five minor villages. The lower middle Wadi Ghiran is a narrow valley 60 kilometers northeast of Jeddah, about 12 kilometers long by an average of one and a half across (see: Fig. 5). In 1987 there were less than 2,000 people in three main and three smaller villages.

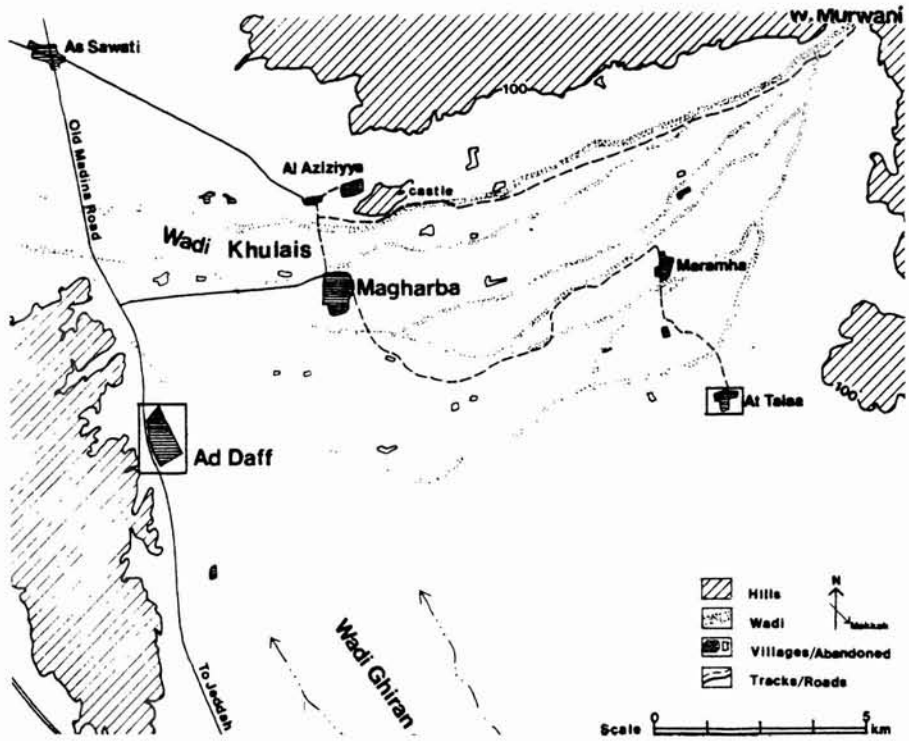

FIG. 2. Wadi Khulais: This oasis is the braided section of the Wadi Murwani just after it reaches the coastal plain. It has long been farmed and also ravaged by floods. Over half of the twenty hamlets are abandoned partially or completely. Several place names commemorate sites raised above the flood plain. (Adapted from the 1:50,000 map of Khulais, 1981).

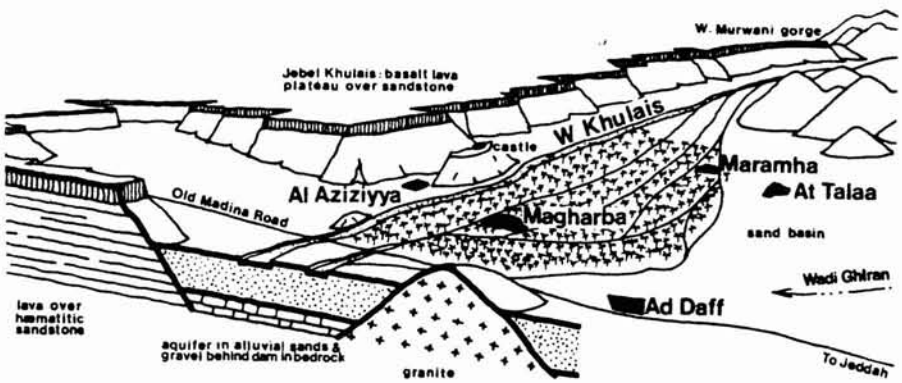

FIG. 3. Wadi Khulais: This pictorial section shows the dominant harrat lava plateau above the oasis. The palm trees symbolise the approximate area of semi-wooded farmland (Adapted from Kassih *et al.*[5]).

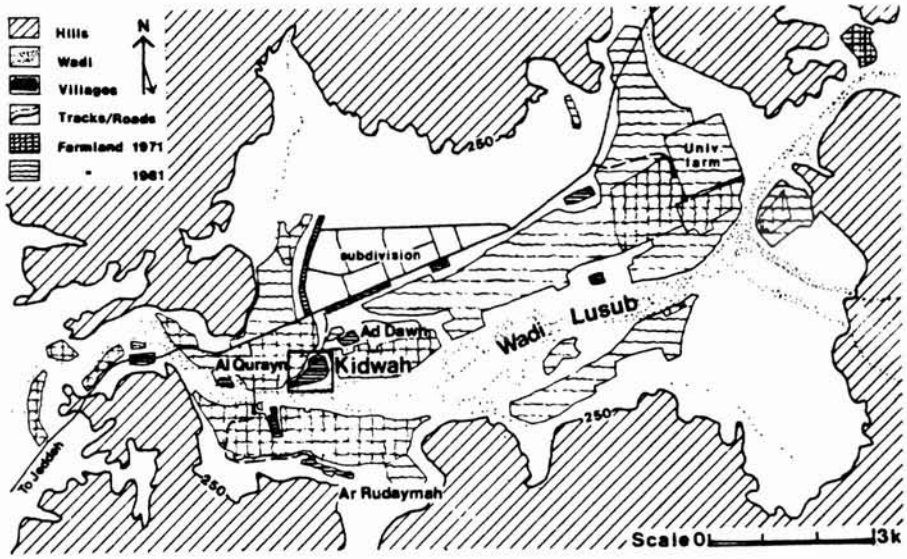

FIG 4. Haddat ash Sham: The enclosed nature of the valley is clear. The asphalted road to Jeddah avoids the wadi bed which is bridged. The layout of the undeveloped subdivision is shown, also the differences in the extent of farmland between 1971 and 1981. (Adapted from the 1:50,000 maps of Halimah 1971 and 1981).

FIG. 5. Wadi Ghiran. A narrow linear oasis with fields and palm groves on wadi terraces. Development of the scattered hamlets will remain limited as long as the main track runs up the wadi bed. (Based on the 1:50,000 map of Isfan, 1981).

2. Historical Background

The historical importance of this chain of settlements has been as wells beside or near to the old trading and pilgrimage route between Makkah and Madinah. The Prophet Mohammed himself (p.b.u.h.) is recorded as passing through Wadi Ghiran on the first Hejira in 622, and the 14*th* century traveller Ibn Batuta mentioned a souk, a pool and many palm gardens at Khulais. Souk Khulais, now known as Magharba, was peopled by Harbi tribesmen when the traveller Burckhardt was there in 1815 and later settled by Maghrebis who may originally have come to garrison the fort overlooking Khulais. Later still the north edge of the wadi under the castle was settled by Saeedi fellahin from Upper Egypt, because of its nearness to Makkah[5].

Burckhardt[6] mentions at Khulais a tepid stream, cattle (recently reintroduced in covered dairies), and the presence of both bedouin robbers and their pilgrim victims. Most settlers in the area came from subtribes of the warlike Harbi, accompanied by communities of Muwalid. The forts at Khulais, Usfan and Abu Shuaib near Al Jumum testify to this hazard, although the villages themselve were not walled, being peopled largely by tribesmen either related to the marauders or under their protection. The area's recent history is in ways the converse of the growth of Jeddah, always a waterless city. To supply it and the local villages as they grew, and also to condition the water produced by desalination, the government set up a company, Al Ayn Al Aziziyya, to provide water from under Wadi Fatima from 1948 and Wadi Khulais from 1965. The result has been to decrease the quantity and quality of the groundwater available to the wadis for irrigation and thus to diminish the area of farmland, hastening the remarkable social changes of the last fifteen years.

3. Topography of the Area

The three areas differ considerably in character. Khulais is the fertile northern quarter of a wide flat sand basin. The usually subterranean Wadi Murwani here emerges from an open gorge in the foothills to become the Wadi Khulais, braiding out over the plain in time of flood. Haddat ash Sham is hidden from the desolate sand basin south of Usfan behind a narrow band of hills. The small broad valley of the Wadi Lusub is totally enclosed by them, its western end being well-watered and green. The valley is punctuated by the old hillside village of Al Qurayn rising above the seyl bed, an unusual site in this part of the country. The middle Wadi Ghiran is a foothill wadi, largely seyl bed, but bordered by strips of palm grove and fields on the wadi terraces.

These villages lie on the gravelly sandy alluvium between the foothills of the Hejaz mountains where most of their water comes from, and the desert coast. Though most of the underlying rocks are granitic this countryside is crossed intermittently by tongues of lava flowing in narrow plateaus towards the sea which help to define the valleys studied. This volcanic harrat is, on a geological time-scale, still very active, as witnessed by the massive flow which stopped just short of Madinah only 730 years

ago. In fact, as illustrated in Zaidi[7], their stream-like shapes in this area show that they once flowed in valleys: the lava streamed down the valleys, hardened, protecting the soft sedimentary rocks beneath, the plateaus resulting when the softer rock on either side was eventually eroded away.

A desert undergoes much erosion by water though this is brief since it is very concentrated. The rainstorm-fed seyls are quickly lost in evaporation instead of slowly sinking into water-bearing strata beneath. One result is alluvial deposits of some depth in the basins. Another is the cautious siting of villages on terraces, hillocks and banks just above this fertile soil. Even then the houses are sometimes aligned as at Maramha in Khulais, so that the tracks between them can become part of the watercourse when floods occur.

Erosion by winds also affects the farmland. Where there are no barriers, windborne sand collects, especially on the windward flanks of the foothills. There are extensive dunes, including crescent-shaped barchan dunes, visible from the new Madinah highway west of Khulais. When the southern and south-eastern spring moonsoon wind (Al Aziab) blows across the Khulais basin sand encroaches onto the farmland and into houses and windbreaks must be planted. Fields are often fringed with a protective screen of sorghum or sudan grass. But the prevailing north-west wind influenced the orientation of the old houses which present their long sides to it for better cross-ventilation, and their narrow ends to the hot west afternoon sun (see: Fig. 6).

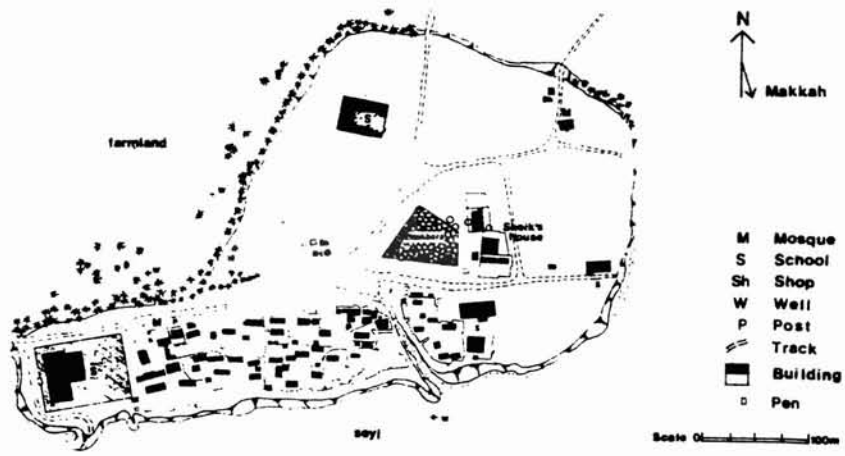

FIG. 6. Al Kidwah Village, Haddat ash Sham, 1986: This layout of the original half of the village along the seyl bank typifies a traditional plan. Mosques lie between the houses and fields for ease of use. Communal facilities are on the public edge, the cemetary (makbara) being outside the old village. Family courtyard houses are clustered together with semi-private spaces in between. Houses are broadside to the prevailing north wind with courtyards usually on the south side. Some are also oriented towards Makkah. Larger air-conditioned new houses are square. Animal pens are downwind. Kidwah is the central village of the wadi, hence the schools. (Adapted from Hejazi *et al.*[20]).

4. Water Resources

The Khulais sand basin is underlain by a large aquifer of shallow alluvial gravels and sands, fed mainly from the north-east by Wadi Murwani. This wadi extends 180 kilometers into the mountains where an average annual rainfall of 175 mm can be more than three times that of a dry year at Khulais[8]. This aquifer is dammed at its outlet from the basin by an underground lip of rock, and varies in depth with the amount of water withdrawn by pumping or recharged by floods. According to a report by hydrology consultants Italconsult in 1969[9] on the water resources of the region for the preceding three years, about 10-15% of the surface water inflow was assumed to run out towards the sea, and almost three times as much to be lost by evapotranspiration by phreatophytes. These are deeprooted wild plants such as the salt-tolerant *Tamarix aphylla* and *Suaeda monoica* widespread in western Khulais. The remaining water is still adequate to sustain farming, but is gradually diminishing in quantity. The aquifer is also fed from Wadi Ghiran in the southeast. This wadi overlies a channel aquifer where water is still often visible on the surface almost year round, perhaps due to the lack of cultivable soil to absorb the surplus. It therefore used to be known locally as the wadi of malaria[10]. Haddat ash Sham in a separate watershed to the southeast lies over a larger aquifer. Its average rainfall, for 1967-75 at least, was nearly double that of Khulais[11].

In Wadi Fatima even in 1964, according to the Italconsult report[12], the water balance of the lower wadi was overdrawn, more being extracted than was recharged by rainfall, and that in Wadi Khulais was only just in balance considering the water loss to various sources. For this are the two major hydrological events of the recent past were :

i) The establishment by the government of the Al Ayn Al Aziziyya Water Company which started pumping water to Jeddah from six wells in the Wadi Murwani and the Khulais oasis in 1965 to supplement and condition Jeddah's desalinated water supply; and

ii) The fifteen-day Ar Rubua flood in Khulais of April 1975 which half demolished many of the little mudbrick villages distributed amongst the braids of the wadi, creating a major need for resettlement, and also destroyed many farmlands and orchards.

Another report on the region's water supplies by Sogreah[13] stated that the water table under the Khulais oasis was in 1965 from 2 to 8 meters deep and there were over forty wells in the valley. Official records showed that between 1965 and 1975 from 13 to 19% of the total water annually extracted was pumped to Jeddah, decreasing that available for irrigation.

Although by 1989 this withdrawal rate had dropped by half of that for 1965, of which 65% was pumped to Jeddah and 35% used in the local villages, there were then only sixteen working wells left in the valleys[14]. The water table, having dropped about a meter per year, was between 18 and 43 meters deep, and the water was increasingly saline, especially downstream. The irrigated area was smaller and the soil had begun to be tainted by salt. Water pumped by the company is stored in water

towers and distributed to standpipes in the villages, but owing to its saltiness fresh drinking water is now often brought in from elsewhere. The effect of the disastrous flood of 1975 which lay on the ground for fifteen days was to recharge this reservoir, soon to be diminished again by drought, but at the cost of considerable soil salinity due to surface evaporation over a silty hardpan. Over 25 centimeters of topsoil was washed off in places, revealing a fossil savanna soil, relict of an earlier less severe climatic period in the Tihama[15]. And periodic floods still cross the basin, destroying access roads. A dam across the Wadi Murwani was considered in order to increase recharge of the aquifer and to provide protection from floods, but it was not built because the bedrock in the gorge was judged unsuitable for its construction[16].

The water table in the wells in Wadi Ghiran is a little nearer the surface: between 8 and 25 meters deep, but is increasingly brackish. Much of this water is being drawn off three kilometers out in the plain and removed by a chain of tankers to supply the Jeddah construction industry. By contrast, Haddat ash Sham is only beginning to be deeply affected by withdrawal for the city so that the west end of the valley preserves the bright greens of a flourishing oasis. The water table varies between 2 and 15 meters deep under the west end of the valley, though even there are some shallower wells, fed probably by tributuaries, are brackish[17]. However, during 1989-90, water from new wells on private land was withdrawn so fast that the water table at the University farm dropped by at least two meters during the year[18], and palm groves near Al Qurayn at the west end are dying. This water is trucked to Jeddah for private profit.

5. Changing Patterns of Land Use

In Khulais there were around 1970 some 2,500 hectares of arable land[19]. Where not washed away by the seyl, tainted by salt or covered by sand, the alluvial deposits are fertile and in some places deep. To take one example of its use studied by one of our student teams in 1985 in At Talaa (Fig. 7), a remote village of 600 people[20]. This is itself a refoundation after the 1975 flood when the villagers of Tuwayrif had to be rescued by helicopter from a nearby hillock (Talaa) which became the site of the new village. Its lands have been in places scoured by flood and encroached on by sand, and it depends as much on grazing as on farming. Thirty-two hectares were farmed by 38 farmers (a quarter of the population), divided among 25 irrigated and 15 seasonal farms of an average size of 0.8 hectare. Two thirds of the village families owned about 1600 grazing animals: 1300 sheep, 220 goats and 150 camels. Most of the labourers were Pakistani or Egyptian, then earning between 600 and 1000 Riyals per month. At that time the richer farmers might earn around SR4500 per month, smaller farmers SR2500, and lower level government employees, SR2500-3500 per month for work usually less arduous and socially more acceptable than farm work.

The tradition of splitting up landholdings between sons is now countered in the area by the selling of land owing to the lack of cheap water to work it. Thus, the combined effects on Khulais of the decrease in available water, its increase in depth and salinity and the ravages of the flood, have been to lessen the area cultivated and the

profitability of farming except to well capitalised farmers. These are usually outsiders from Jeddah such as dairy companies. Some farms in the area are also more recreational than productive in function. Even the use of annual fertilisation by directing part of the seyl to benefit the fields from flood-borne silt has diminished with the increasing use of well water which leaches nutrients from the soil, requiring the use of costlier chemical fertilisers. Where, forty years ago, some crops would be exported abroad in winter from the hinterland of Jeddah, they now cannot compete in price with imported food[22]. Labour is now expatriate and Yemeni labourers in the village of Falaj were given half the crop, a practice which might well add to the cost except that crops are often destroyed since they cannot be sold[23]. This may be typical.

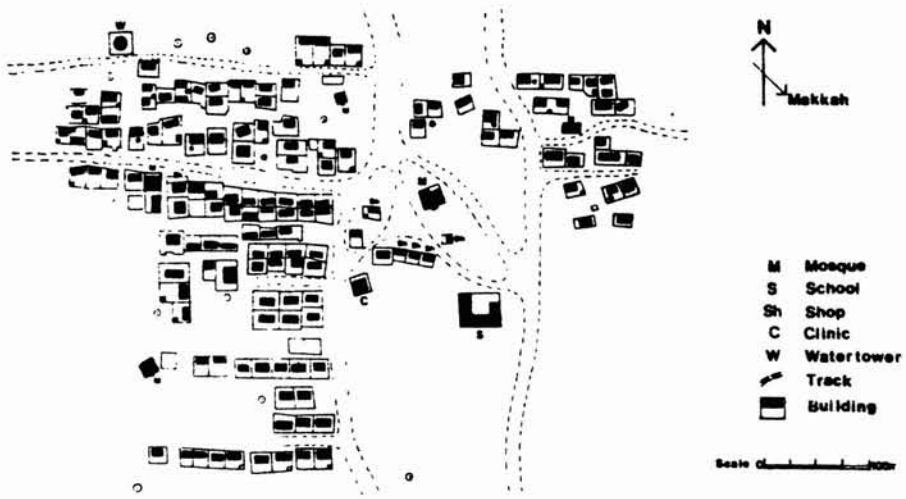

FIG. 7. At Talaa Village, Khulais, 1985: The layout, on a flat arid site, of a village re-founded in 1976 after floods. The traditional pattern is modified by the standard municipal lot size and by the need for car access. However, houses are still oriented to the wind and a few also to Makkah. There are fewer semi-private spaces. The original settlement is on the west side with communal facilities on the public track to preserve the privacy of the villages. The northeast settlement is from another village and family. Each subgroup has its own mosque, the large central mosque being public. (Adapted from Badabaan *et al.*[21]).

Plants are often cultivated on the sides of little ridges to avoid the salt crust left by irrigation, which might need a third as much water again to be flushed out. Owing to this salinity, crops such as oranges and potatoes have had to be replaced by those tolerating a more sporadic and brackish supply of water such as okra, bell peppers and fodder grasses, and crops needing capital and time to mature such as dates are replaced by faster maturing vegetables. The 1968 figures for the whole Jeddah area quoted by Italconsult[24] showed that 63% of the crops then grown were vegetables, 21% tree crops and 16% herbaceous plants, mainly sorghum and millet, and a quarter of the total agricultural income came from raising livestock. Almost certainly tree crops have since declined with the fall in groundwater levels.

The pattern is more traditional in the middle Wadi Ghiran wherever fields and palm groves lying behind levees reinforced with tamarisk have escaped the seyl. In Haddat ash Sham however, on the evidence of updated 1:50,000 scale maps, dated 1971 and 1981, the area of land farmed has actually doubled during the last decades mainly due to richer farmers (such as the University's Agricultural Research Station, founded there in 1985), who can afford deep wells, the cost of which in the area then ran to 1000 riyals per meter of depth[25]. However, given sweet water, the soil will yield good crops and many varieties are being tested on this farm. The supply of adequate skilled labor to maintain a hundred hectares with modern machinery is its chief difficulty[26]. Its presence seems to have encouraged settlement nearby, but as most of the local people can earn higher wages in other work than farming, the Research Station must depend on expatriate contract labor. Meanwhile, with government subsidies, several local small farmers have returned to herding. Thus, for various reasons, the land ownership pattern in these oases is slowly beginning to alter away from the familial small-holdings to larger scale units. It is clear that these oases are paying a price for the expansion of the city. What compensations encourage the villagers to remain there?

6. Government Sponsored Resettlement

The main incentive to stay is proximity to family, family lands and the village community, since the marriagable womenfolk of the tribe are far less mobile than its men. But the pull of the greater incomes, convenience and opportunities of the cities increases with every improved highway. Many would prefer to stay, given better services, especially electricity, piped drinking water and asphalted roads, with schools and clinics within easy reach. And in fact small villages have proliferated since 1970, owing to financial privileges extended by the government to village heads[27]; also to improved transportation. The government's response, embodied in the four 5-year plans since 1970, comes via the Planning Department of the Ministry of Municipal and Rural Affairs working with the local sub-emirates and baladiyyas of Khulais, a municipality which also administers Ghiran, and Al-Jumum, a village cluster centre, which administers Haddat ash Sham. The government has gladly provided these much needed services but with an understandable bias towards encouraging the villagers to relocate in new subdivisions beside a highway, where all these services can be economically supplied and up-to-date subsidised houses built at the same time.

Within the Emirate of Makkah, according to the Director General of the western region for the Ministry[28], its present policy follows a trial plan to secure the opinions and concurrence of the villagers themselves on the development of their areas. Subcommittees for twenty small municipalities and village cluster centres have been formed from emirate representatives, the staffs of the ministries supplying services, local sheikhs and members of the village umdahs (councils). The plan aims to get more precise statistics and directions for action, to secure cooperation between villagers and government, to staunch the flow to the towns, and to homogenise the population. It hopes to achieve this latter by expanding the settlement of outsiders into

subtribal or extended one-family villages, also by decreasing the number of these and concentrating the people in fewer larger villages.

Its main instruments are the provision or withholding of services, and of permits to build, and the land grant plus a 25-year interest-free discounted construction loan from the Real Estate Development Fund of the Ministry of Finance of SR200,000 per applicant. The subsidy is granted to poorer people holding title to land but without a habitable house, who live, work, or originate in the area, and is aimed especially at the young. In addition it provides for orphans, divorcees, widows and spinsters over forty. The government also subsidises farm machinery, fertilisers and pesticides. Today therefore in terms of services and levels of income the average villager even in his old home is incomparably better off than he was thirty years ago.

Prompted by necessity, three new villages were planned for Khulais, starting in 1977: Ad-Daff, now completed, Al Aziziyya, half completed, and one at At Talaa, barely started. One for Ghiran at An Nuzha is growing fast but one for Haddat ash Sham north of Al Kidwah is yet little more than broad roads in the sand. The resettlement at Khulais was made easier by the Ar Rubua flood. So many villages of the old sometimes charming but primitive mud brick houses had been partially destroyed that there was an urgent need for new housing out of the path of the seyl. Ad Daff was founded on a bare site on the old Madinah road beside and slightly above the valley (see: Fig. 8). It is now flourishing, housing in 1985 over 2,400 people from twenty-five different families or subtribes from all over the basin[29]. It is like a small-scale suburb of Jeddah, where the sociable semiprivate family clusters of courtyard homes have been replaced by rows of two storey houses on standard 20 × 20 meter plots and a grid of wide streets. However, family privacy with some freedom is still maintained by the use of the high-walled roof instead of the sand garden, a pattern which has developed into a new village house type in the region. There is no farmland nearby but many trees have been planted in the village, including a windbreak on the south edge facing the desert. The appeal of higher education, the convenience of good access to work outside the valley and the inconvenience that sons, or sons-in-law in some villages, can no longer easily build near their parents' house are all factors that accelerate cultural change away from the old patterns. Since farmwork itself is of low status to the local people, their land is already worked by peasants from abroad usually living near the fields.

Al Aziziyya was less lucky, being sited on unsuspected layers of silt and clay which became unstable as soon as houses began to drain onto them. According to a report commissioned from the Faculty of Engineering, King Abdulaziz University[30], this had damaged half the houses by 1985, made some uninhabitable, and halted further growth. The villagers worst affected were to be offered new sites south of Ad Daff. The proposed development at At Talaa was to be partly for the villagers of Maramha not far-off, which still sits on low land and through whose streets flood waters occasionally run. But they resist losing their separate community identity, and objected to the move[31]. The new village for Ghiran, An Nuzha, is on the same main road as

Ad Daff but further south in a more desolate but equally convenient situation, and has gradually filled up with subsidised two-storey houses. These however tend to be rented out by their villager owners who still cannot accept living so far – from four to ten kilometers – from their fields and traditional communities[32]. New Haddat is little more than wide streets, a clinic, and private development along the opposite side of the roads flanking the empty subdivision which is providing a new commercial centre for the valley. The reluctance to resettle may be connected with past inter-village disagreements about the allocation of government funds[33]. Besides, few people in this pleasant oasis yet want to leave their villages for a bare new site, even though nearby. Time will tell.

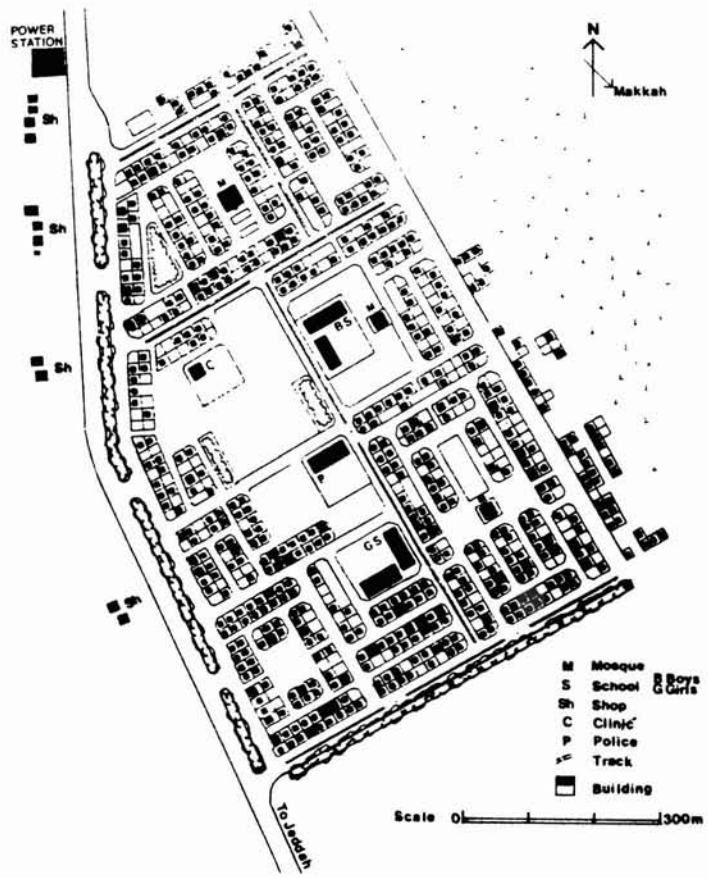

FIG. 8. Ad Daff Village, Khulais, 1985: The layout of a large new village following municipal guidelines: a 20 × 20 meter lot size with 2 meter setbacks from lot boundaries, on a grid of standard width asphalted streets. There are no semiprivate social spaces: former village neighbours simply live on the same street in two-storey houses. Community facilities are central rather than peripheral except for the shops on the main road into Khulais. There is ample landscaping maintained by the municipality. (Adapted from Abdeen *et al.*[29]).

7. Summary of Problems and Recommendations

In summary, the three main changes in the areas studied have been: the diminishing water supply, the transformation of the economic base, and the gradual supersession of old villages by new more urban settlements. The problems caused by these changes with some comments on their possible solution are discussed below.

7.1. Water Supply

Over and above the perennial and often destructive effects of flooding, the main problem has been the decrease in the quantity and quality of the water supply, due principally to demands on it made by the growth of Jeddah. This has reduced the amount available for irrigation, and made impracticable the use of any surplus to flush excess salts from the soil. It has also lowered the water table below the level which small farmers can tap without digging deep wells which most cannot afford. They are therefore forced either to abandon the land and seek outside work, to sell it to outsiders (and, more rarely, to become tenants where once they were freeholders), or to return to herding. In addition the concentration of salts in the reduced water supply makes it less drinkable and leaves a deposit of salt on the surface of irrigated fields. This necessitates the purchase of drinking water, and restriction to growing only crops tolerant of a reduced and more brackish water supply. The dependence on well water also tends to leach nutrients from the soil which therefore requires increased fertilisation, the expense of which is subsidised by the government. Nevertheless, the soil where not too saline, can be productive and could support a more prosperous agriculture. What measures could be taken to establish it?

The percentage of the water from Khulais which is used to improve the sterile condition of desalinated water in 1989 averaged only around 7% of Jeddah's water supply although it might average at least 50% of the water available to the wadi. In fact a 1975 report on the water resources of the Khulais basin by Italconsult[34] recommended that groundwater extraction should not continue after 1981 under any circumstances because of the risk of irremediable damage to the aquifer and the agriculture of the area. This drain on its resources should be stopped as has already virtually happened in the Wadi Fatima[35]. If this is not done, it might still be possible to repair part of the past damage and recharge the aquifer by recycling some of the effluent from the new tertiary sewage treatment plant in Jeddah, using an existing pipeline in the reverse direction. However, this is assumed at present to involve a cost equal to desalination due to the need for strict sanitary precautions[36] and so, like a dam across the Wadi Murwani, to be impracticable. It therefore remains for the government first to ensure an equitable supply from the existing wells, then to subsidise the supply of potable water where necessary. As recommended in successive Italconsult reports[37, 38] water supplies might be augmented by eliminating the considerable area of phreatophytes to diminish water loss by evapotranspiration, and by increasing the chances of recharging the aquifer by the use of rock dikes to retard the flow of flood waters entering the plain. Finally, the government could increase the technical advice which it gives to small farmers in dealing with the problems in cultivation caused

by its water distribution policies. In light of the national policy to achieve self-reliance through the establishment of a strong economic base however, these can only be seen as half measures.

7.2. Economy

The area's past economic viability has depended on farming supplemented by herding livestock. There are a few minor industries such as the brick factory at An Nuzha in Ghiran, but these are basically only a local service. How can the farming be made profitable again? Three directions have been followed: concentration on vegetables for the city market and animal fodders; the establishment of large farms such as the Baksh dairy farm in Khulais or the University farm at Haddat ash Sham, employing 60 and 100 laborers respectively; and herding. However all three have disadvantages. Scattered small farmholdings, the result of the traditional division of land between every son, are generally unprofitable since their produce finds it hard to compete with foreign foods on the markets in Jeddah, and is often wasted. One answer here might be for the government to buy up local produce for redistribution or to encourage the formation of farmers' cooperatives for the growing and marketing of crops. But even this profitability remains dependant on expatriate peasant laborers who form a largely transient workforce averaging about 15% of the village populations, intrusive on and excluded by Saudi village society. Industrialised farming has certainly begun to take root, but not much to the benefit of the local population. The profits go to the investors, usually merchants from Jeddah, and owing to the locals' view of most of the work as demeaning, expatriate labor must be imported to do it, and benefits from the wages. The change in attitudes necessary here would be very difficult to instil.

The return to herding on any scale, especially of camels owned by wealthy townsmen for reasons of status, is bound to aggravate the overgrazing which with the destruction of trees for firewood and charcoal, has become such a blight on the countryside since oil wealth began to subsidise enormous increases in the number of herds. Each camel may eat at least 20 to 25 kg of green forage per day, and each sheep or goat, from 10 to 15 kg[39]. Outside the fenced farms therefore, the pressure of too many animals for the carrying capacity of the land, here as everywhere in Arabia, especially when they are supplemented by fodder and water from elsewhere, is the chief cause of the increasing and continued desertification of the countryside. A partial solution here could be found in the traditional hima and in methods similar to the current practice of the National Commission for Wildlife Conservation and Development at Harrat al Harrar in the far north[40]. This is to institute a form of range management, of a size of range acceptable to local tradition, divided into four sections and grazed on a four year cycle. This should allow sufficient growth and regeneration of plants that the carrying capacity of one quarter of the area would probably equal that of the whole area beforehand.

7.3. New Settlements

The third major change, interlocked with the previous two, is the restructuring of

rural society. Here the government has been most consistently constructive on the villagers' account. It realises that the attraction of city opportunities and incomes has to be countered by the provision of improved facilities and services nearby. Frequently our student teams found that the lack of services was among the villagers' chief complaints. Left to themselves however, local standards in these matters are often low: electricity cables trail across the ground and garbage is strewn everywhere as though it were still mostly biodegradable as in nomadic days. Dust, filth, stagnant pools and the percolation of sewage to groundwater must contribute to disease, and certainly detract from the appearance of the villages. The authorities might be able to instil more pride in and care for their environment by sponsoring a permanent competition to reward clean and well-kept villages.

However, it must be recognised that it is government policy to establish large subdivisions with rows of urban two-storey dwellings in place of the traditional clusters of courtyard houses, as being easier to service, maintain and control, rather than to extend services to the old less viable outlying settlements. In effect it is benignly superseding many of these with their exclusive subtribal or family loyalties. Even if desired it is probably too late now to reconstitute many of the village societies as they used to exist: at least among the young, the sense of an alternative life style (fostered partly by television) is too well established. Already in several of the villages studied, government employment of one kind or another was responsible for between one and two thirds of the total workforce, some of it far from the area. The sheikh, previously the respected village leader, is tending to become merely the lowest level of administrative official. The village, previously poor but integrated with its surroundings, will tend at least near the cities, to become a prosperous commuter suburb increasingly dependant on incomes distributed by the central government. It is an open question whether socially more is gained than lost by this disruption of the traditional self-reliant social fabric. But to return to the old ways and the forms that embodied them, except as the preservation of historic heritage, would be merely sentimental.

8. Conclusion

Such government sponsored resettlement is a notable contrast with the old communities, scattered and grown up organically wherever there was adequate soil and water to sustain them, and sized in proportion to these resources. It is of the same order as the industrial farming and routine commuting to bigger centers, of higher education and widespread government employment which is already established in the Wadi Fatima. There however, the opportunities as well as the pressures have been greater and felt long enough to encourage more spontaneous change. Everywhere, this change marks the profoundest transformation of these rural societies of the Tihama since the days they abandoned wandering for their farms. The ancient division between the communities of the desert and the sown has here been overlaid within a generation by the even greater contrast between the country and the town.

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دور الحكومـــة والتغـــير في قرى إقـــليم جـــدة

جـــون أدي
قسم عمارة البيئة ، كلية الهندسة ، جامعة الملك عبد العزيز
جـــدة - المملكة العربية السعودية .

المستخلص . ثلاث واحات لمنطقة جـدة نوقشت : وادي خليص ، وهدى الشام وأسفل منتصف وادي غران من حيث الخلفية التـاريخية ، والتضـاريس ومصـادر المياه . هذا بالإضافة إلى دراسة الانخفاض في نوعية وكمية المياه ، بناءً على التغير في نسق استعمالات الأراضي واتجاه الحكومة لمعالجة ذلك بإنشاء قرى جديدة لحماية المصادر الطبيعية .