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MONITORING AND ASSESSMENT OF URBAN ENCROACHMENT IN EL-MINYA GOVERNORATE USING REMOTE SENSING DATA

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ABSTRACT

It was found that the cultivated area in the Nile Valley and Delta are suffering from a serious problem of urbanization. The rate of urban increase ranges between 0.4% in Hassan Basha village and 29.0% in Saft ash-sharqiyah village (El-Minya). The magnitude of increase is more pronounced in the villages, Martin et al. 1988 found that the soils of these areas fall within class 1 and 2 according to their suitability for cultivation. The aerial photographs have offered the advantages of stereovision, large scale, good resolution and restricted manipulation of photo interpretation. The use of the temporal advantage of satellite images allows the authors to monitor, map and evaluate the rate of urban growth in the villages of this study.

Keywords: Remote sensing, Desertification, Urbanization, Egypt.

INTRODUCTION

The main problem facing Egypt is the slow expansion of the cultivated land compared to the rapid increase of human population. The cultivated area represents about 4% of the country's surface, while the rest is covered by Sahara.

The policy of the Egyptian government is oriented towards the horizontal expansion of the cultivated area through the reclamation of desert soils. However, urbanization is a serious problem overcoming any expansion in the arable land.

Urban encroachment on the fertile irrigated lands resulted in a complete loss of more than *0.5* million feddans in the valley and delta.

In order to assess and to map the problem, it is important to describe and to quantify the various aspects of urban encroachment. The aspects to be taken in consideration should, in the first stage, describe the current condition of the problem.

One of the serious processes of soil degradation is the urban encroachement on the account of arable land. The long term determinant effects of urbanization occur when it develops haphazardly especically in the absence of land use maps. In Egypt, the rapid rates of population growth was the main reason for urban encroachment. Abdel-Hady et at. (1983) indicated that during about fourty years from 1937 to 1976, the cultivated area increased by *11.05%,* while the population has increased by 40.11 *%.* Accordingly, the per capita share has decreased from 0.34 to 0.16 acre. In the end of this century, it is estimated that each acre will be supporting ten individuals compared with 6.3 individuals in 1976. Urban enchroachment has sequentially accelerated especially after the change from war economy to peace economy. The Government has reacted against the problem of

urbanization and issued several laws to control the land utility, these laws also prohibit any other activities to scrape or derelict the agricultured lands.

Remote sensing is used throughly in urban analysis, urban planning and urban development. Aerial photographs were used since 1940's for defining the urban areas. However, the first large scale systematic use of such photographs to identify land dereliction started in the 1960's (Collins and Bush, 1969a, 1969b, 1971 and 1974)~ Recently, the availability of spot satellite, capable of resolution down to ten meters in the panchromatic mode and twenty meters in the multi-spectral mode provides advances in remote sensing applications (Philipson et al., 1988; Holoz, 1985 and Duggin, 1984). Bridges (1987) used the multi-altitude and multi-spectrality of remotely sensed data in .analysis urban surface features of London area.

The importance of using remote sensing technologies in the study of urban encroachment has been confirmed in many scientific and technical meetings and by several authors. It proved to be highly effective in the physical, biological and human processes which lead to desertification.

Obtaining a synoptic view and insight different factors leading to the problem. Also, the multi temproral nature of remote sensing documents makes it possible to determine the rate of urban encroachment.

The current investigation aims to study the urban enchroachment against the fertile land in 17 villages in El-Minya Governorate, Egypt using the remote sensing data.

Location and Environmental Conditions of Study Areas

Since urban enchroachment represents a great loss of arable land, thus the study 'sites were chosen within the Nile Valley in El-Minya Governorate (Fig. 1). A number of 17 villages was under taken to represent different spatial extention and environmental conditions. The remote sensing data used in studying each site was selected in accordance with the area of the site and the resolution of remote sensing data. The chosen study sites (17 villages) are:

a. Samalut: Hilwah, Siyalah ash-Sharqiyah, Siyalah al-Gharbiyah, Minbal, Istal, Manqatin, Dayr Samalut, Kawm Al-Lufi and Bani Ghani.

b - El-Minya: Damshir, Idmu, Towah,\ Bani Ibrahim, Saft ash-Sharqiyah, Saft al-Khammar, Hjassan Basha, Nazlat al-Amudalyn and Dimshaw Hashim. Aearial photographs at scale of 1:10.000, dated in 1985 and TM satellite images at scale 1:50.000, dated in 1990 were used.

MATERIALS AND METHODS

Monitoring and measuring of urban areas:

Aerial photographs

Aearial photographs at scale of 1:10.000, dated in 1985 were manually interpreted to monitor urban areas. The spatial disarray (image textures) of component land covers .gives the urban areas their phyrsical recognizibility.

The interpretation scheme of aerial photographs was followed as a process, devided into a number of phases and resulted in the ultimate goal. Generally, the phases were defined:

Fig 1

a. photo-reading. (i.e. detection, recognition and identification),
b. drawing of lines in a systematic way so that logical boundaries are obtained and
c. deduction or interpretation.

In order to perform the deduction phase, a set of topographic maps at scale 1:25.000 were used. The urban areas were allocated on the topographic maps and boundaries were exactly delineated on transparent papers. A series of copy magnification was performed on these boundaries in order to bring the corresponding map to the same scale. Digital planimeter (PLACOM, KP-90N) was used to estimate the area of each study site.

Digital analysis of satellite images

Satellites provide more accessible data from electro-optical sensors. In addition, they have the advantages of imaging the earth on a continuous basis and have frequent 'opportunities to collect data on a particular locality. They are more readily and cheaply available than airborne data and lend themselves to computer-based processing techniques. In this study, an estimation of increasing urbanization in 17 villages was carried out. The estimation was performed on 36 and 37 years interval by using computer-implemented techniques for digital image processing of landsat TM satellite images, which cover the same area. The available software used in this work includes some computer programs, namely; categorical analysis (CA) and landsat categorical processor (LDCP) which categorize landsat digital reflectance and automatically calculate ureas of each category.

Soil analysis

Anumber of selected soil profiles was studied to represent the areas which are encroached by urbanization. The evaluation of these soils was based on the morphological description of the profiles and on some physical and chemical properties of soil samples. (Martin et al., 1988).

Evaluation is based on the usual rate of population growth in most developing countries as 1:2% per year (Abdel Samie et al. 1989 and 1990). Thus the suggested rating values for different aspects of urbanization is shown in Table (1).

Table (1). Class limits suggested for assessing different aspects of urbanization (FAO/UNEP, 1983).

Desertification Aspect	Assessment Factor	Slight	Class Limits		
			Mod.	Severe	V. Severe
Status	Loss of fertile land within Ten years. (% of inhabited area)	<20	20-30	30-50	> 50
Rate	Increase in urban area per year	1-1.5%	1.5-2.5	2.5-4.5	>5
Risk	Population growth	<1.5	1.5-2	2-3	> 3

RESULTS AND DISCUSSION

Aerialphoto interpretation:

Seventeen sites have been studied using aerial photographs (1985) campared with topographic maps of earlier dates (1953 and *1954).* It was

possible to delineate the boundaries of each study site (see examples in Fig. 2). The high resolution of the photography and the stereoscopic view were quite helpful for the exact delineation of these boundaries. The use of digital planimeter, (PLACOM, planimeter KP-90N), resulted in measuring the urban area of each study site in two different times (Table 2). The measurements make it possible to notice a significant increase of urbans with respect to the time interval. The rate of increase ranges between 1.0 to 7.9 in Samalut district and ranges between 1.0 to 10.2 in most of the the villages of El-Minya, except the rates of increase of Hassan Basha and Towah Bani lbrahim were 0.4 ‘and 0.9, respectively (Table 2). The results reveal that the aerial ‘photographs, with a satisfactory resolution are capable to insinuate the insight of very small areas. Satellite images may fail to provide such data about the evaluation of status, Rate and risk of urbanization.

Table (2) Acreage of urban areas mentioned from aerial photographic (PH), satellite images (SI) and topogrocphic maps (M).

Name of village	Time of map, photography and satellite		Acreage *feddan	Increase of urbanization feddan	increase rate of urbanization Per year feddan
Samalut	M	1954	26.2		
Hilwa	PH	1985	52.4	26.2	3.2
	SI	1990	66.7	40.5	4.3
Siyalah ash-Sharqiyah	M	1954	14.3		
	PH	1985	23.8	9.5	2.1
	SI	1990	59.5	45.2	8.8
Siyalahal-Gharbiyah	MPH	1954	19.0		
	PH	1985	40.1	21.1	3.6
	SI	1990	64.3	45.3	6.6
	M	1954	26.2		
Minbal	PH	1985	90.5	64.3	7.9
	SI	1990	131.0	104.8	11.1
	M	1954	31.0		
Istal	PH	1985	40.5	9.5	1.0
	SI	1990	83.3	52.3	4.7
Manatin	M	1953	35.7		
	PH	1985	71.4	35.7	3.1
	SI	1990	107.1	71.4	5.4
Dayr Samalut	M	1953	19.0		
	PH	1985	38.1	19.1	3.1
	SI	1990	119.1	100.1	5.4
Kom al-Lufi	M	1954	19.0		
	PH	1985	28.6	9.6	1.6
	SI	1990	47.6	28.6	4.2
Bani Ghani	M	1953	35.7		
	PH	1985	59.5	23.8	2.2
	SI	1999	95.2	59.5	4.5
El-Minya					
(Nazlar al-Amudayn)	M	1954	35.7		
	PH	1985	57.1	211.4	1.9
	SI	1990	95.2	59.5	4.6
Hassan Basha	M	1953	21.4		
	PH	1985	23.8	2.4	0.4
	SI	1990	66.7	45.3	5.7

Table (2) continued

Damshir	M	1953	381		
	PH	1985	73.8	35.7	2.9
	SI	1990	126.2	88.1	6.2
Idmu	M	1953	38.1		
	PH	1985	50.0	11.9	1.0
	SI	1990	71.4	33.3	2.4
Towah Bani Ibrahim	M	1953	16.7		
	PH	1985	64.3	47.6	0.9
	SI	1990	142.9	126.2	20.4
Saft ash-Sharqiyah	M	1953	7.1		
	PH	1985	11.9	4.8	2.1
	SI	1990	83.3	76.2	29.0
Saft al-Khammar	M	1953	19.0		
	PH	1985	81.0	62.0	10.2
	SI	1990	195.2	176.2	25.1
Dimshaw Hashim	M	1953	31.0		
	PH	1985	54.8	23.8	2.4
	SI	1990	90.5	59.5	5.2

*** Feddan = 4200 in^2.**

Monitoring urbanization from satellite images

The same 17 sites have been studied using satellite images (1990). The same digital planimeter used for measuring the urban areas.

The data reveal a significant increase in urban area with time. However, the magnitude of increase depends on the strategical significance of the location. The increase of urban area reached about 548 feddan in the nine sites of Samalut and about 664 feddan in the eight sites of El-Minya during 37 years (Table 2). The percentage increase in its urban area reached 242.5% and 320.8% of the oringinal coverage in 1953 and 1954 in the study sites of Samalut and El-Minya respectively. These areas are highly fertile land in the Nile Valley. This very high increase in urbanization is a clear indication of the great danger to Egypt's very fertile .cultivated land.

Soil characteristics and classification

Two of soil profiles, representing the urbanized areas were studied. These soils occupy the alluvial flood plain (Table 4 and morphological description) which is almost characterized by a clayey texture, good structure and non saline to slightly affected. The soil profiles can be classified as Typic Haplo-Torrerts at Samalut and Torrifluvent at El-Minya U.S.D.A. (1998).

Evaluation of urbanization

The obtained results from both aerial photographs and satellite images were employed in the modified FAO/UNEP provisional methodology (1983) to evaluate the magnitude of urbanization. It was possible to estimate classes of status, rate and risk of urbanization (Table 3). The results show that the study areas are almost exposed to a very severe to severe status and rate of urbanization, all the study areas face severe risk. These measures are based on the assumption that all urban expansion happened on cultivated fertile land. The new communities are the hope now to save the remaining fertile land from being lost. The estimation of the risk is based on a population

increase of 1.200.000 people per year, which represent 2-3% in a population of about 65 million people. Following a more civilized population policy may reduce the future risk of urbanization. This can come through a detailed study of people's socio-economic behaviour.

Table (3) Evaluation of different aspects of urbanization (1953 & 1954 to 1990)

Name of village	Status		Rate		Risk	
	(1)	class 1	(1)	class 2	(1)	Class 3
Samalut						
Hilwa	43	Severe	4.3	Severe	2-3%	Severe
Siyalah ash-Sharqiyah	88	V. severe	8.8	V .severe	2-3%	Severe
Siyalah al-Gharbiyah	66	V. severe	6.6	V. severe	2-3%	Severe
Minbal	111	V. severe	11.1	V .severe	2-3%	Severe
Istal	47	Severe	4.7	Severe	2-3%	Severe
Manatin	54	V. severe	5.4	V. severe	2-3%	Severe
Dayr Samalut	142	V. severe	14.2	V. severe	2-3%	Severe
Kom al-Lufi	42	Severe	4.2	Severe	2-3%	Severe
Bani Ghani	45	Severe	4.5	Severe	2-3%	Severe
El-Minya						
Nazlat al-Amudayn	46	Severe	4.6	Severe	2-3%	Severe
Hassan Basha	57	V. severe	5.7	V. severe	2-3%	Severe
Damshir	62	V. severe	6.2	V. severe	2-3%	Severe
Idmu	24	Moderate	2.4	Moderate	2-3%	Severe
Towah Bani Ibrahim	204	V. severe	20.4	V. severe	2-3%	Severe
Saft ash-Sharqiyah	290	V. severe	29.0	V .severe	2-3%	Severe
Saft al-Khammar	251	V. severe	25.1	V. severe	2-3%	Severe
Dimshaw Hashim	52	V. severe	5.2	V. severe	2-3%	Severe

(I) Loss of fertile land within ten years (% of inhabited area).
(2) Increase in area per year. (3) Population growth.

Table (4) Some physical and chemical characteristics of two representative profiles.

Prof. No.	Depth, cm.	pH (1:2.5)	$CaCO_3$	T.S.S. (1:5), mmhos/cm.	Grain size distribution			Texture
					Sand %	Silt %	Clay %	
1	0-20	7.9	2.3	1.35	6.3	25.2	68.5	clayey
	20-55	8.7	1.3	1.70	12.8	23.8	63.4	Clayey
	55-90	7.8	1.8	1.91	2.8	27.6	69.6	Clayey
	90-120	8.1	2.1	1.83	3.1	35.2	61.7	Clayey
2	0-20	8.1	2.3	1.23	20.2	34.2	45.8	Clayey
	20-50	8.0	2.5	1.10	21.9	39.8	38.3	Clay loam
	50-130	8.3	2.6	1.64	24.4	37.9	37.7	Clay loam

Profile Number : 1
Area : Samalut.
Soil classification : Typic Haplo Torrerts.
Crop : Cultivated with Egyptian clover.
Drainage : Well drained.
Ground water : 150 cm below he surface.
Erosion : None.
Additional notes : Deep wide cracks (more than 30 cm).

Profile Description:

Depth (cm)	Description
0-20	Very dark grayish brown (10 YR 3/2, moist); clay; moderate medium subangular blocky structure parting to moderate fine granular; sticky and plastici; many fine, medium and coarse roots; slightly effervescent; abrupt wavy boundary.
20-55	Very dark grayish brown (10 YR 3/2, moist); clay; moderate medium and coarse prismatic structure grading to massive; slickensides; sticky and plastic,m ; common fine roots; slightly effervescent; clear wavy boundary.
50-90	Very dark grayish brown (10 YR 3/2, moist); clay; medium prismatic structure parting to medium blocks; slickensides; sticky and plastic; few to common fine roots; slighlty effervescent; gradual wavy boundry.
	Very dark grayish brown (10 YR 3/2, moist); clay; massive; slickensides; Sticky and plastic; few fine roots; slightly effervescent.

Profile Number **:** 2
Area **:** El-Minya..
Soil classification **:** Torrifluvent.
Crop **:** Sorghum for fodder.
Drainage **:** Well drained.
Ground water **:** At 150 cm below the surface.
Erosion **:** None.
Additional notes **:** Cracks (about 10 cm. Deep).

Profile Description:

Depth (cm)	Description
0-20	Dark brown (10 YR 3/3, moist); clay; moderate medium subangular blocky weak fine granular; sticky and plastic; many coarse to fine roots; abrupt wavy boundary.
20-50	Very dark grayish brown (10 YR 3/2, moist); clay loam; moderate coarse and medium subangular blocky structure; common fine and medium roots; slightly effervescent; abrupt wavy boundary.
50-130	Very dark grayish brown (10 YR 3/2, moist); clay loam; weak subangular blocky structure; sticky and plastic; common fine roots; slightly effervescent.

CONCLUSION AND RECOMMENDATIONS

The cultivated areas in the Nile valley and Delta are suffering from a serious problem of urbanization. This problem has caused an irretrievable loss of very fertile suitable soils. The problem is characterized by a very severe status and rate while the risk is severe to very severe. The Government has reached against the problem and issued several laws to control the land utility. These laws also prohibit any other activities to scrape or derelict the agricultural lands.

Remote sensing techniques have been used in detection, monitoring and evaluation of urbanization in the study areas. The aerial photographs have offered the advantages of stereovision, large scale, good resolution and restricted manipulation of photo interpretation. The use of the photographs made it possible to 300 m on the small urban areas. The use of satellite images also resulted in monitoring, mapping and evaluating or urbanization in towns and large villages.

It is strongly recommended to plan the new urban in the desert regions in order to attract people out of the Nile Valley and Delta. It is very important to stress on the decenteralized authorities and to re-distribute the administrations all over the different Covernorates. The law system has to be very strict against invasion, of any form, in the agricultural land.

It goes without saying that in order to establish stable new communities in desert areas, they must be supperted by sustainable economic prejects. These can be based on agricultural, industrial or touristic projects according to the condition of the sites and its relative advantages.

REFERENCES

Abdel-Hady, M.A.; A.G. Abdel Samie; A.S. Ayoub, l.A. E1-Kassas and A.O.C. Saad, (1983) Landsat digital data processing for estimation of agricultural land in Egypt. 24p. Remote Sensing Center, Cairo.

Abdel- Samie, A.G.; H.A. Younes; A.S. Ayoub; A. Gad and M.A. Abdel Rahman, (1989) Desertification of arable lands in Egypt, Progress Report, 69p. Cairo Academy of Scientific Researoh and Technology, Remote Sensing Center.

Abdel-Samie, A.G.; H.A. Ydunes; A.S. Ayoub and A. Gad (1990) Desertification of arable lands in Egypt-Urbanization, Progress Report 67p. Cairo : Academy of Scientific Research and Technology, Remote Sensing Center.

Bridges, E.M. (1987) Surveying derelict land, Clarendon Press, Oxford, IY7p.

Collins, W.G. and Bush, P.W. (1969a) The definition and classification of derelict land. Journal of the Town Planning Institute, 55*:* 111-115.

Collins, W.G. and Bush, P.W. (1969b) The use of aerial photographs in the study of derelic land. Journal of the Town Planning Institute, 55*:* 246-255.

Collins, W.G. and Bush, P.W. (1971) Aerial photography and spoiled lands in Yorkshire. The Planner, 57*:* 103-1 10.

Collins, W.G. and Bush, P.W. (1974) The application of aerial photography to survey of derelict land in U.K., in E.C. Barrat and L.E. Curtis (eds.), Environmental Remote Sensing, Arnold, London, 167-181.

Duggin, J.A. (1984) Thesis, Yale Univ. New Haven, V.T. [cited from lal, R. and Stewart, B.A. (1990) Soil Degradation, Spring, New York].

FAQ/UNEP (1983) Aprovisional methodology for soil degradation assessment, FAQ, Rome.

Holoz, R.K. (Ed.) (1985) The Surveillant Science : Remote Sensing of the Environment, Wiley, New York.

Martin, T.C.; H.A. Younes; Flack, T.E. and Abdel-Rahman, M.A. (1988). Soil salinity and water table assessment in the Serry Command area. Ministrg of Public works and Water Resources. Regional Irrigation Improvement Project, El Minya Govemorate, Egypt. CID/CSU Technical Report No. 6.

Philipson, W.R.; Bamaba, E.M.; Ingram, I. and Williams; V.L. (1988) Land-cover monitoring with spot for land Fill investigations. Photogrammetric Engineering and Remote Sensing, 54, 223-228.

U.S.D.A. (1998). "Keys to Soil Taxonomy". Soil Survey staff. Hand book, Cornell Univ.

تتبع وتقدير الزحف العمرانى بمحافظة المنيا باستخدام بيانات الاستشعار من البعد

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بعد الزحف العمرانى على الأراضى الزراعية الخصبة من أهم عمليات تدهور الأراضى الزراعية فى مصر حيث أنها تؤدى إلى تدمير القدرة الإنتاجية للتربة. وتقدم الدراسة الحالية تقديرا لحجم مشكلة الزحف العمرانى فى ١٧ قرية موزعة فى مركزي سمالوط والمنيا، والقرى المختارة ذات مساحات وظروف بيئية مختلفة، مع عمل تقييم للحالة الراهنة ومعدل ومخاطر الزحف العمرانى بكل موقع استنادا إلى طريقة معدلة من طرق منظمة الأغذية والزراعة وبرنامج الأمم المتحدة للتنمية ومنظمة العلوم الأساسية عام ١٩٨٣، وكان أساس التقييم أن المتوسط المقبول لزيادة المساحة العمرانية هو ١% من الزيادة السكانية سنويا.

استخدمت صور الأقمار الصناعية Landsat-TM الملتقطة فى عام ١٩٩٠ ذات مقياس ١: ٥٠٠٠٠ ، كما استخدمت الصور الجوية Airial photographs لعام ١٩٨٥ بمقياس ١: ١٠٠٠٠، التى تسمح بدراسة وتحليل المساحات ولظواهر الصغيرة ومقارنتها مع خرائط طبوغرافية قديمة لعامى ١٩٥٣، ١٩٥٤ لمواقع الدراسة، كما تم جمع وتحليل عينات التربة من قطاعات أرضية تمثل المناطق الزراعية التى حدث عليها الزحف العمرانى.

أوضحت الدراسة أن أراضى وادى النيل الزراعية بمحافظة المنيا تعانى من خطورة الزحف العمرانى . حيث أظهرت النتائج باستخدام الصور الجوية (١٩٨٥). وجود زيادة معنوية فى الزحف العمرانى بالنسبة للفترة الزمنية للدراسة (٣٦، ٣٧ عاما) حيث يتراوح معدل الزيادة بين ١,٠-٧,٩ فى قرى مركز سمالوط وبين ١,٠-١٠,٢ فى معظم قرى مركز المنيا. وفى حالة استخدام صور القمر الصناعى (١٩٩٠) فى رصد الزحف العمرانى فى نفس المواقع، أظهرت البيانات أن نسبة الزيادة فى المساحة العمرانية بلغت ٢٤٢,٥%، ٣٢٠,٨% من المساحة التى كانت تشغلها فى عامى ١٩٥٣، ١٩٥٤، فى مواقع الدراسة بقرى مركزى سمالوط والمنيا على التوالى. وتم قياس المساحات بجهاز قياس المساحات (البلانيميتر). إلا أن معدل الزحف العمرانى يرتبط باستراتيجية المكان. وترتبط غالبا الزيادة فى المساحة العمرانية أيضا بالظروف الاجتماعية والاقتصادية للسكان حيث يميل الناس إلى المعيشة قريبا من مناطق الخدمات المركزية . وتكون دائما هذه الزيادة العمرانية على حساب الأراضى الزراعية الخصب التى تمد المدن القريبة بمصادر الغذاء.

أظهر تقييم عملية الزحف العمرانى أن منطقة الدراسة كانت معرضة إلى حالة راهنة (Present status) ومعدلات تزايد (rate) ومخاطر (risk) قاسية. كما أوضحت الدراسة الحلقية لقطاعات التربة

والتحاليل المعملية للعينات فى المناطق التى حدث عليها الزحف العمرانى أن التربة تتبع Typic Halpo , torrerts فى أراضى مركز سمالوط، وتتبع Torrifluvent فى أراضى مركز المنيا حسب التقسيم الأمريكى لسنة ٩٨، وهى أراضى رواسب نهر النيل ، وهى أرضى غير متأثرة إلى متوسطة التأثر بالملوحة، ويقع تصنيفها فى الدرجتين الأولى والثانية من ناحية الإنتاجية.

خلصت الدراسة إلى ضرورة المضى فى سياسة إقامة المدن العمرانية الجديدة فى الأراضى الصحراوية ، مع إعادة توزيع الخدمات المركزية واتباع سياسة حضارية لتنظيم السكان