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Source: Mountain Research and Development, 29(1) : 36-45

Published By: International Mountain Society

URL: https://doi.org/10.1659/mrd.995

Mountain Research and Development (MRD)
An international, peer-reviewed open access journal
published by the International Mountain Society (IMS)
www.mrd-journal.org

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Influence of Ecological Defarming Scenarios on Agriculture in Ansai County, Loess Plateau, China

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At present, the return of farmland to forests is the key ecological conservation policy in use to control soil erosion and restore the eco-environment of the Loess Plateau, China. In order to explore policy-driven ecological defarming scenarios, Ansai County is taken as a case study. The land use map in 2000 and the topographic and slope map (taking the defarmed slopes with 15°, 20°, and 25° as the defarming thresholds) were used, supported by spatial analysis techniques in geographic information systems (GIS). This paper simulates and analyzes the scale and spatial difference of ecological defarming of Ansai County, the subsidy demand for defarming, and the influences of defarming on agricultural development. The results show: (1) The area of defarmed land with slopes greater than 25° in Ansai amounts to 3451.05 ha, which accounts for 2.84% of total area with slopes over 25°, and the defarming index will be 3.14%. The total subsidy demand for defarming land will be 6884.84 × 10^4 yuan (RMB) or US$ 1008.03 × 10^4. The loss of agricultural food products that results from defarming will be 955.17 t in the average year, or 1.66% of total average annual production. (2) The area of defarmed land with slopes over 20° in Ansai will increase to 36,281.61 ha, which accounts for 19.74% of total area with slopes over 20°, and the defarming index will be 32.96%. The total subsidy demand for defarming land will be 72,381.81 × 10^4 yuan or US$ 10,597.63 × 10^4. The loss of agricultural food products due to defarming will be 10,041.9 t in the average year, or 17.50% of total average annual production. (3) The area of defarmed land with slopes over 15° in Ansai increases to 101,807.99 ha, which accounts for 37.23% of total area with slopes over 15°, and the defarming index will be 92.49%. The total subsidy demand for defarming land will be 203,106.94 × 10^4 yuan or US$ 29,737.47 × 10^4. The loss of agricultural food products owing to defarming will be 28,178.06 t in the average year, or 49.10% of total average annual production.

Keywords: *Defarming; slope; policy; agriculture; subsidies; GIS; interviews; Ansai County; Loess Plateau; China.*

Peer-reviewed: *November 2008* ***Accepted:*** *December 2008*

Introduction

The problems of soil erosion and environmental degradation resulting from long-term anthropogenic influences and the inherent vulnerability of the Loess Plateau ecosystem have always been of deep concern to relevant government departments and academic institutions. Past studies have shown that soil erosion leading to undesirable on-site and off-site effects on the Loess Plateau results from a combination of intensive natural erosion and human-induced erosion (Ritsema 2003; He et al 2004).

Ever since the 1950s, especially beginning in the 1970s, with the occurrence of no-flow events along the lower reaches of the Yellow River and with the continuous increase of the duration and extent of no-flow events (Qian et al 2001), many scholars have advocated adopting the policy of slope farmland conversion as a pivotal step to control soil erosion and restore the eco-environment of the Loess Plateau (Kang 1993; Xu 1997; Chen et al 2001; Li et al 2001; Wang et al 2002). In view of no-flow events in major rivers and the flooding that occurred in the lower Yellow and Yangtze Rivers, in August 1999 the central government proposed implementing 4 ecological "defarming" policies: (1) returning farmland to forestland (grassland), (2) closing hillsides to facilitate afforestation, (3) substituting provisions for relief, and (4) instituting individual contracts. These were to be executed in the regions along the upper Yangtze River and on the Loess Plateau (Tian et al 2000; Peng et al 2002). Starting in the year 2000, a defarming campaign was launched in the aforementioned regions as a decisive step to promote the ecological restoration of the Loess Plateau.

International studies have made significant progress in analyzing the drivers and effects of agricultural land use change on the ecosystem, such as soil erosion caused by shifting cultivation, the impact of farm forestry on the ecosystem, etc (Ryan et al 2002; Fu et al 2006; Mottet et al 2006; Galicia and Romero 2007; Neergaard et al 2008). Focusing on the Loess Plateau of China, studies on

http://dx.doi.org/doi:10.1659/mrd.995

farming systems have indicated that restricted access to capital and lack of technical agronomic support were serious impediments to the development of agriculture and the restoration of the eco-environment (Nolan et al 2008). Two crucial areas for ecological restoration were determined in the loess hilly gully region and described as needing more policy and funding support (Xu et al 2005, 2006).

The present paper simulates the scale and differences in spatial characteristics of ecologically defarmed land in different slope categories, analyzes their corresponding influences on agricultural development, and summarizes the implementation of the ecological defarming policy in the past few years, supported by GIS spatial analysis techniques. The paper aims to contribute to the scientific basis needed for further implementation of the ecological defarming policy on the Loess Plateau.

Study area and current status of defarming

Survey of the study area

Ansai County (36°30′45″N–37°19′31″N; 108°51′44″E–109°26′18″E) is located in the hilly gully region of the Loess Plateau, northern Shaanxi Province, and it covers an area of 2950.2 km^2. The topography shows decreasing elevation from the northwest (1731 m) to the southeast (997 m). Ansai County features hills, gullies, and plains interlaced with each other, and a gully density of about 4.7 km/km^2 (Lu and van Ittersum 2004; Lu et al 2004). According to the 1987 Agricultural Resources Investigation Report on Ansai County, the annual mean temperature is 8.8°C. The rainy season comes in July to September, with an average annual precipitation of 505.3 mm and great interannual variation. In Ansai County, the predominant climate is semiarid.

The zonal vegetation of forest–shrub–steppe, formerly presenting a strong transitional trend, has deteriorated. In the southern part of the county, there is sparse secondary forest. The county has natural grassland consisting largely of shrubby grassland, steppe, and low humid grassy marshland. The primary soil is dominated by gray-brown soil and loessal soils such as loess soil and soft sandy soil, and organic matter contents under the plough layer are relatively low. The Yanhe River runs from north to south; after joining the tributary of the Xingzihe River, it flows southeast out of the county. The problem of soil erosion in Ansai County has been serious: approximately 97% of the total land area has been eroded, and the soil erosion modulus ranges between 4000–15,000 $t/km^2/y$. The average annual amount of sediment transported is 2388×10^4 t, and the average annual sediment transport modulus amounts to 8373 t/km^2. This is reckoned as serious soil erosion (Jiao et al 2004).

According to annual statistics for 2006, Ansai County exercises jurisdiction over 14 townships, with 211 administrative villages. In 2006, it had a population of 16.70×10^4, of which 14.60×10^4 people were dependent on agriculture. The gross domestic product (GDP) was 1.69 billion yuan (US$ 1 was equal to 7.5 Chinese yuan in 2007), and the proportions in GDP of the primary, secondary, and tertiary sectors were 15.3%, 62.0%, and 22.7%, respectively. Agriculture was predominant in the rural economy; a per capita net income per farmer for the county totaled 2609 yuan in 2006.

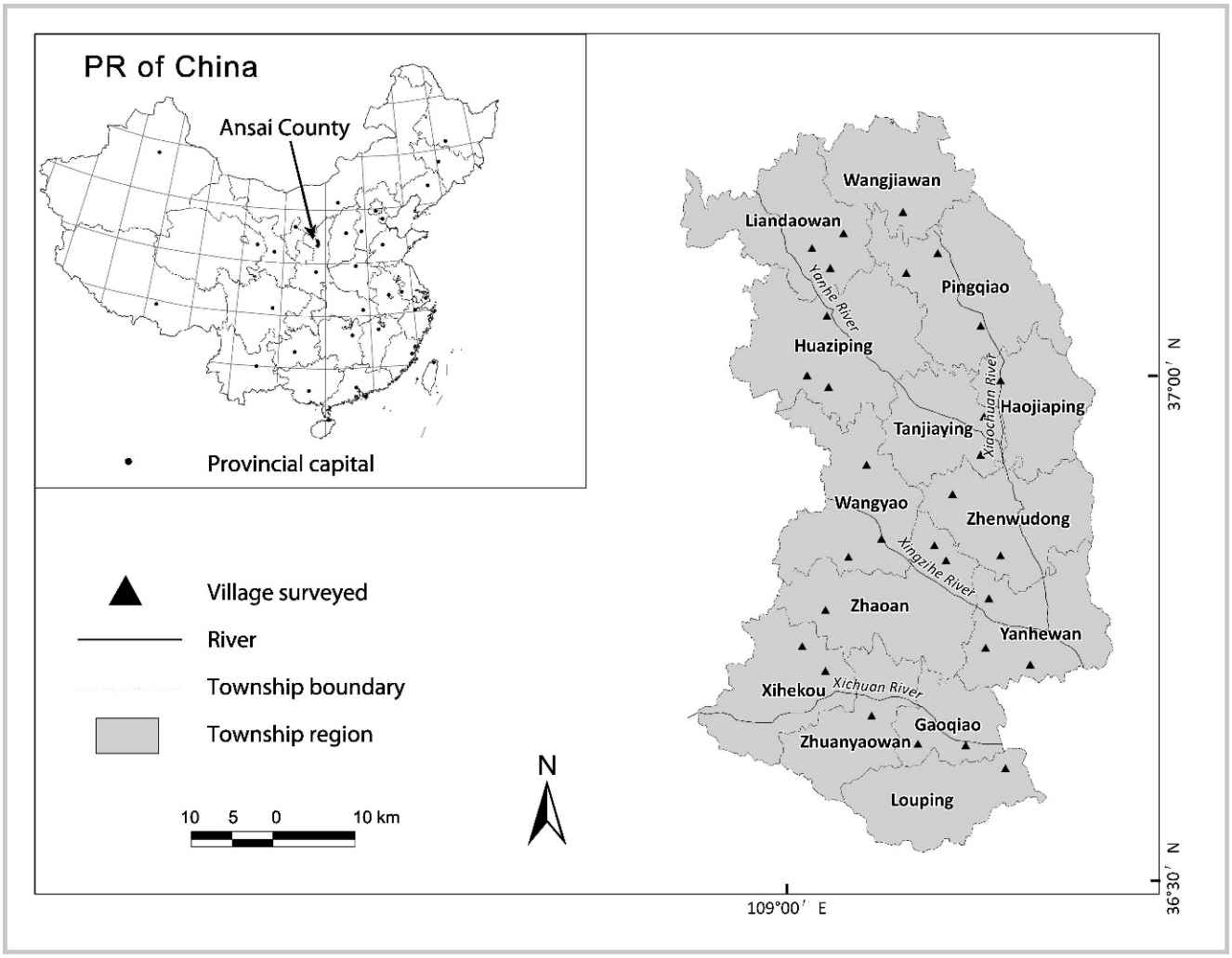
State of defarming

In essence, the aim of the ecological defarming policy is to offer government support, in the form of subsidies for losses due to defarming, for farmers willing to convert cultivated land on steep slopes into forests and grassland. The implementation of the defarming policy has caused problems, such as the degree of defarming on slopes, the influence of defarming on agricultural development, the mode of forests and grassland conversion, and the mode and amount of investment.

Ansai County was one of the first counties to begin with implementation of ecological defarming. Slope land in Ansai County was mainly defarmed during 2000 to 2003, for a total defarmed area of 33,040 ha (17,040 ha in 2000, 1333.33 ha in 2001, 5333.33 ha in 2002, 9333.33 ha in 2003), which accounts for 30.02% of total farmland area. The defarmed area per capita was 0.213 ha, and the investment provided by the government for ecological defarming reached $50{,}000 \times 10^4$ yuan by the end of 2006. The policy increased farmers' income and the ratio of forest and grass coverage, but it decreased grain yield and agricultural employment. As of 2006, the subsidies from the government made up 17.14% of total farmer income, the ratio of forest and grass coverage increased by 11.2%, and 7585 more persons joined the migrant rural labor force by comparison with 2000. From May to July 2006, a sample survey was conducted face to face among 149 rural households in 30 villages in Ansai County (Figure 1). During the process of implementing the defarming policy and defarming slope land from the year 2000 to April 2005, the following took place:

1. The area of defarmed slope land was relatively large, but the ratio of slope land to cultivated land was still rather high. The total defarmed slope land area for the 149 households surveyed amounted to 176.67 ha; consequently, the slope land area decreased from 255.1 ha in 2000 to 78.03 ha in 2005. At the beginning of 2006, the total cultivated area of the 149 households surveyed was 115.47 ha, 67.58% of which was slope land (78.03 ha).
2. Governmental subsidies for defarming land increased farmers' cash income. The poorer the farming household was, the more subsidies it received. The total cash receipt of the 149 households surveyed in 2005 amounted to 118.86×10^4 yuan, of which governmental defarming subsidies amounted to 12.97 ×

FIGURE 1 The distribution of villages surveyed in Ansai County. (Map by Tang Qing and Xu Yong)



10^4 yuan, representing nearly 11% of household income. As to the ratio of defarming subsidies to total cash receipt, the 7 poorest households surveyed received >45% of income from subsidies, 22 households with relatively low living standards received 20%–45%, and 52 households that had a secure life with just enough food and clothing got 20%–10%. For the 68 households that led a moderately prosperous life, less than 10% of their household income came from subsidies.

3. Although the farmers were in favor of the defarming policy, they still considered the possibility of recultivating when the defarming subsidies would be suspended. According to the survey of the 149 households, 139—or 93.29% of the total—answered "good" or "relatively good" when asked "What is your view of the current defarming policy?" Three, or 2.01%, answered "just so-so," and seven households answered "no good." When asked "Do you still intend to recultivate the slope land that you defarmed if the government does not provide subsidies for defarmed land several years later", 94—or 63.09% of the total—answered "no"; and 55—or 36.91%—answered "yes."

Methodology, parameters, and data source

Methodology

The following method and technical procedure was used for this study:

1. Preparation of maps and graphic superimposition: assisted by GIS spatial analysis techniques, a land use map of the study area was developed by using remote-sensing images and aerial photos, as well as drawings and extracts from topography maps. Digitalizing of the topographic map made it possible to vectorize details at township scale and superimpose the land use map, the topographic map for slope gradients, and the map of township boundaries.

2. Simulation analysis of defarming scenarios: in light of the definitive slope-related defarming slope parameters developed with the help of the GIS, a superimposed map was used to process the data on defarmed land with different slopes.
3. Analysis of demand for subsidies for defarming land: based on the defarming subsidy parameters, we calculated government subsidies and analyzed spatial differences under different defarming conditions.
4. Analysis of the impact of defarming on agricultural development: using the defarming loss parameters obtained through the field survey, we calculated and analyzed the influence of defarming on agricultural development (mainly on farming).

Parameters and data sources

Next, we introduce the parameters of the defarming slopes, defarming indices, defarming subsidies, and the defarming losses.

1. Defarming slope parameters refer to the limit of the proper defarming slope. According to experimentation and observed results (Tang et al 1998), shallow gully erosion of slope land is the primary factor that aggravates soil erosion. Shallow gullies generally occur on critical slopes ranging from 15°–20°, and they frequently occur on steep slope land >25°. Moreover, according to observations by Hu Shixiong and others (Hu and Jin 1999), cultivated land with slopes between 20° and 22° is the most vulnerable to soil erosion on the Loess Plateau. Thus, adequate defarming slope parameters are 15°, 20°, and 25°.
2. The defarming index refers to the percentage of the area of defarmed slope land under research compared to the total area of cultivated slope land in the year when the implementation of the defarming policy started. This index can effectively reflect the spatial difference among studied defarmed land with different slope gradients.
3. Defarming subsidy parameters: in line with the regulations of the "Returning farmland to forest" policy, the government gives households a lump-sum of 750 yuan/ha for forestland and grassland construction per defarmed hectare of cultivated land, 2100 yuan/ha per year for grain during 8 years, and 300 yuan/ha for forestland and grassland management and maintenance.
4. Defarming loss parameters: defarming loss mainly refers to the decrease in the gross amount of grain as a result of the reduction of arable land. Cultivated land on relatively steep slopes in the study area chiefly produces millet and bean, and yield per unit area mainly depends on annual precipitation. According to the field survey and a long-standing case survey of villages carried out in Ansai County from 1997–2004, the yield per unit area of millet and bean grown on cultivated slope land varies considerably in different years: the average yield per unit area of millet in the cultivated land is 2599 kg/ha in abundant years, 1107 kg/ha in an average year, and 702 kg/ha in a drought year, while the corresponding yields per unit area of bean are 1987 kg/ha, 947 kg/ha, and 632 kg/ha, respectively.

The maps used for the present study were mainly a topographic and slope map, a land use map, and a township boundary map of Ansai County (the latter two were compiled in 2000), all on a scale of 1:100,000. The topographic and slope map, derived from a standard 1984 version of the topographic map on the same scale, was divided into 6 slope gradient types as follows: 0°–5°, 5°–10°, 10°–15°, 15°–20°, 20°–25°, and over 25° (Figure 2A). The land use map was compiled in 2000 based on the interpretation of a Thematic Mapper remote sensing image obtained in the same year, and it was divided into 7 groups and 12 subgroups. The land cover types were composed of cultivated land (irrigated land, terraced fields, sunken land, slope land), gardens, forest (forestland and shrubland), grassland (natural grassland, artificial grassland), residential areas, water bodies, and nonutilized land (Figure 2B).

Defarming scenarios and impacts on agriculture

Analysis of defarming scenarios

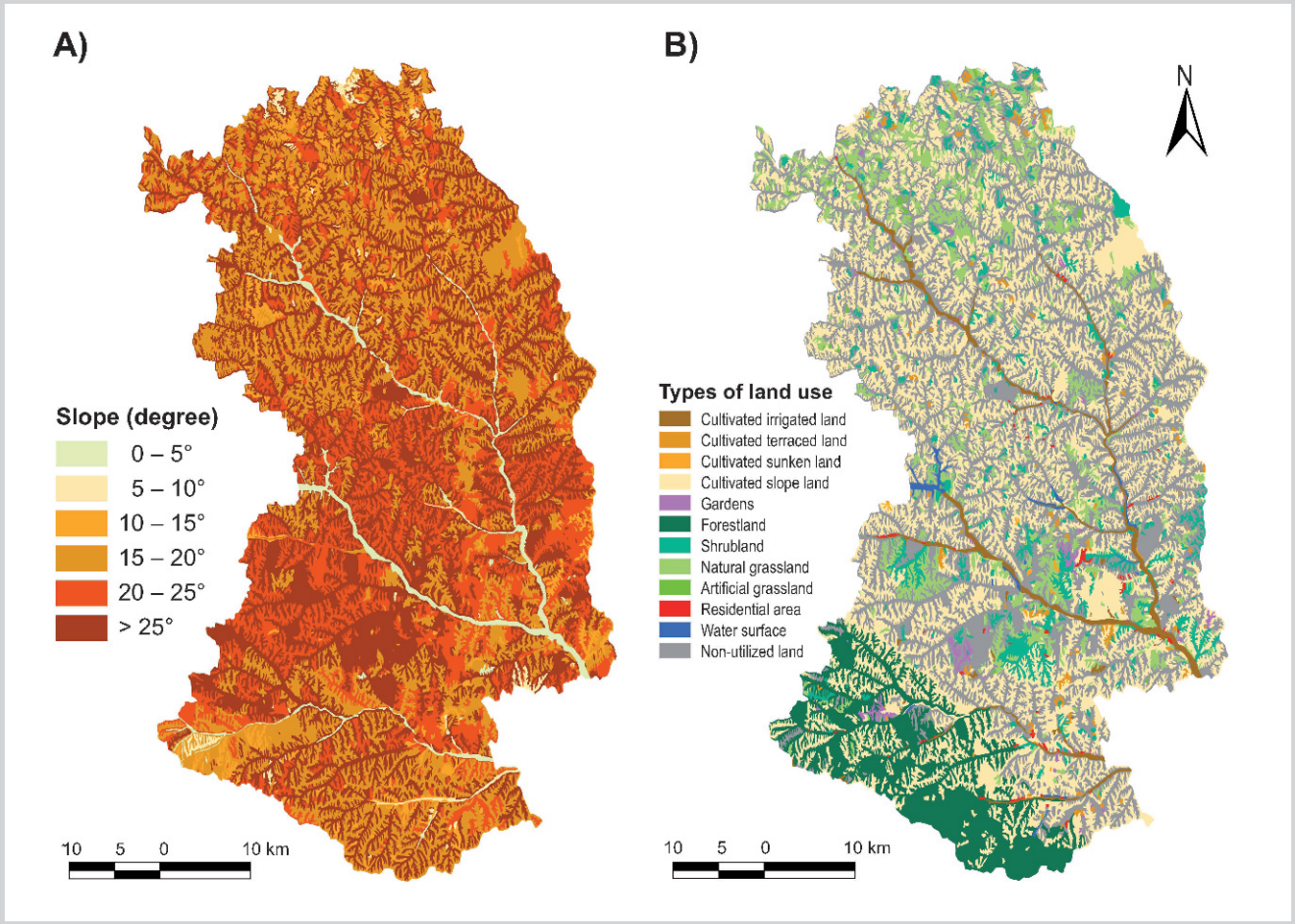
The regional differentiation of slope farmland in Ansai County for 2000 is shown in Figure 3 and Table 1, and the defarming index for each township with different defarming slope parameters (taking 2000 as the starting year) is illustrated in Figure 4.

Taking a slope of 25° as the defarming threshold, a total of 3451.05 ha of land should be defarmed, with a resulting defarming index of 3.14%. The defarming indices of all the townships would be lower than 12%. Of the 14 townships, the defarming indices of 11 townships would be lower than 5%. Zhuanyaowan and Yanhewan townships have the highest potential defarming indices, 11.69% and 10.28%, respectively. By contrast, the townships of Huaziping and Pingqiao have the lowest, only 0.42% and 0.88%, respectively.

Taking a slope of 20° as the defarming threshold, the land to be defarmed is estimated at 36,281.61 ha in total, and the defarming index would be 32.96%. The defarming indices vary greatly for the 14 townships. The highest defarming index is for Zhao'an, 72.92%, while the lowest is for Louping, only 6.69%. Among all the townships, the indices for 4 townships exceed 50%, 4 townships range from 25–50% and 6 townships have defarming indices lower than 25%.

Taking a slope of 15° as the defarming threshold, 101,807.99 ha of land should be defarmed in total, and the defarming index would be 92.49%. The defarming index

FIGURE 2 Topographic and slope map (A) and land use types (B) of Ansai County in 2000. (Maps by Tang Qing and Xu Yong)



for each township is over 70%. Of all the townships, 7 have indices of more than 95%, 5 townships range between 85% and 95%, and the last 2 townships have indices of less than 85%.

Subsidy requirements for defarmed land

Table 2 shows subsidy requirements for defarming Ansai County, where each township is calculated on the basis of the defarming subsidy criterion regulated in the defarming policy. The total subsidy demand for defarmed land with slopes over 25° in Ansai County would amount to 6884.84×10^4 yuan, of which subsidies for forestland and grassland restoration amount to 258.83×10^4 yuan (3.76% of the total), subsidies for grain during 8 years amount to 5797.76×10^4 yuan (84.21% of the total), and subsidies for forestland and grassland management and maintenance during 8 years total 828.25×10^4 yuan (12.03%).

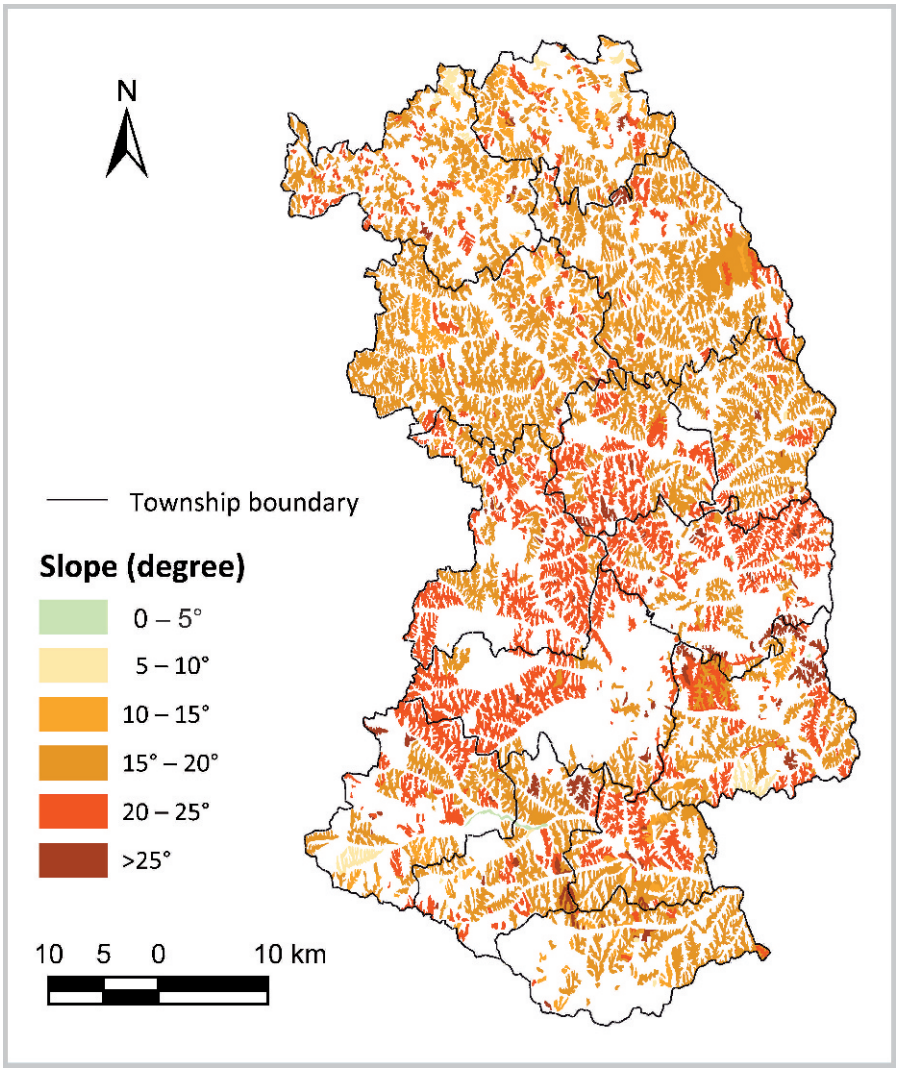
Total subsidy requirements for defarming land with slopes over 20° in Ansai County would amount to $72{,}381.81 \times 10^4$ yuan, or 10.5 times that of defarmed land with slopes over 25°. Of this amount, subsidies for forestland and grassland construction amount to 2721.12×10^4 yuan, subsidies for grain during 8 years amount to $60{,}953.1 \times 10^4$ yuan, and subsidies for forestland and grassland management and maintenance during 8 years total 8707.59×10^4 yuan.

Total subsidy requirements for defarming land with slopes between over 15° in Ansai County would amount to $203{,}106.94 \times 10^4$ yuan, or 29.5 times the amount required for defarming land with slopes greater than 25°, and 2.5 times more than for defarming land with slopes greater than 20°. Of these subsidies, the sum needed for forestland and grassland restoration amounts to 7635.6×10^4 yuan, subsidies for grain during 8 years amount to $171{,}037.42 \times 10^4$ yuan, and subsidies for forestland and grassland management and maintenance during 8 years total $24{,}433.92 \times 10^4$ yuan.

Impact of defarming on agricultural development

The arable slope land in Ansai County produces mainly cereal crops such as millet, bean, and potato; therefore, the influence of defarming on agriculture lies mostly in a reduction of available agricultural food products.

FIGURE 3 Map showing slope gradation for farmland of Ansai County in 2000. (Map by Xu Yong)



According to the sample survey, relay cropping still dominates the farming pattern of Ansai County, and the annual sown area on cultivated slope land accounts for around 30–40% of the total. Based on the data extracted from the superimposed map, deducting noncultivated land (such as marginal land, roads, and flood draining watercourses) by a coefficient of 0.23 and taking the ratio of the annual sown area of cultivated defarmed slope land as 35%—assuming that millet and bean are grown half and half—under such conditions, the reduction in available food products caused by defarming in Ansai County varies a great deal. This is shown in Table 3 for each township for different defarmed slope categories and for different years.

According to statistics, in the past 10 years, for Ansai County, the year 1998 was an abundant year, when gross grain production reached 89,468 t, the year 1997 was a drought year, when gross grain production was only 38,739 t, and the year 2002 was a typical average year, when the gross grain production amounted to 57,388 t. Taking 1998 (the abundant year), 2002 (the average year), and 1997 (the drought year) as a reference, on defarmed land with slopes greater than 25° in Ansai County, the percentages of food reduction in abundant, average, and drought years stand at 2.38%, 1.66%, and 1.6%, respectively; on defarmed land with slopes over 20° in Ansai County, the percentages of food reduction in the corresponding years are 25.06%, 17.5%, and 16.84%, respectively; and on defarmed land with slopes over 15° in Ansai County, the percentages of food reduction in the corresponding years are 70.32%, 49.1%, and 47.24%, respectively.

Discussion and conclusion

Judging from the defarming index, the demand for defarming subsidies and the amount of agricultural food

TABLE 1 Farmland area for the 14 townships in Ansai County according to slope class (unit: ha).

Township	0°–5°	5°–10°	10°–15°	15°–20°	20°–25°	>25°	Total
Liandaowan		317.02	1041.16	5669.69	1203.97	105.51	8337.35
Wangjiawan		243.37	1336.40	3316.28	919.27	95.96	5911.28
Huaziping		73.55	1448.18	11,586.10	1050.75	59.14	14,217.72
Pingqiao		10.08	573.14	11,104.75	1509.70	117.78	13,315.45
Haojiaping		25.63	18.92	5496.75	996.68	78.76	6616.74
Tanjiaying			13.13	2914.59	3421.66	224.80	6574.18
Wangyao			53.95	2885.45	5594.16	100.31	8633.87
Zhenwudong	12.00		47.55	2042.54	4497.50	466.91	7066.50
Zhao'an				1872.70	4905.36	136.59	6914.65
Yanhewan	5.81	372.97	422.21	4245.32	2881.69	908.36	8836.36
Xihekou	82.97	374.30	441.92	3052.98	2650.42	185.67	6788.26
Zhuanyaowan	66.64	42.74	178.86	4030.07	990.67	702.79	6011.77
Gaoping			481.65	2942.92	1994.98	127.91	5547.46
Louping		33.52	545.90	4366.24	213.75	140.56	5299.97
Total	**167.42**	**1493.18**	**6602.97**	**65,526.38**	**32,830.56**	**34,51.05**	**110,071.56**

product loss vary with different slopes. Land with slopes greater than 25° require few subsidies and cause little reduction in grain yield; moreover, the defarming index of such land is too small to fulfill the target for defarming. By contrast, the case of defarmed land with slopes over 15° is just the opposite; the defarming index is relatively high, usually above 70%, but it causes food reduction by a large margin, accounting for nearly 50% in both average and drought years. It also requires far greater governmental subsidies for defarming. Relatively speaking, defarmed land with slopes over 20° has an optimal defarming index, adequate subsidy requirement, and acceptable percentage of food reduction in abundant, average, and drought years.

Actually, defarming land with slopes over 20° has been a main measure of the defarming policy in the past 8 years: 91.07% of farmland area with slopes exceeding 20° was defarmed in 2000–2003. The defarming policy is thus almost completed, and further efforts should concentrate on maintenance of the defarmed area. According to the rate of subsidies in farmer income and the results of the survey that asked whether the farmers would recultivate if

FIGURE 4 Defarming indices for the 14 townships in Ansai County according to the 3 main slope classes.

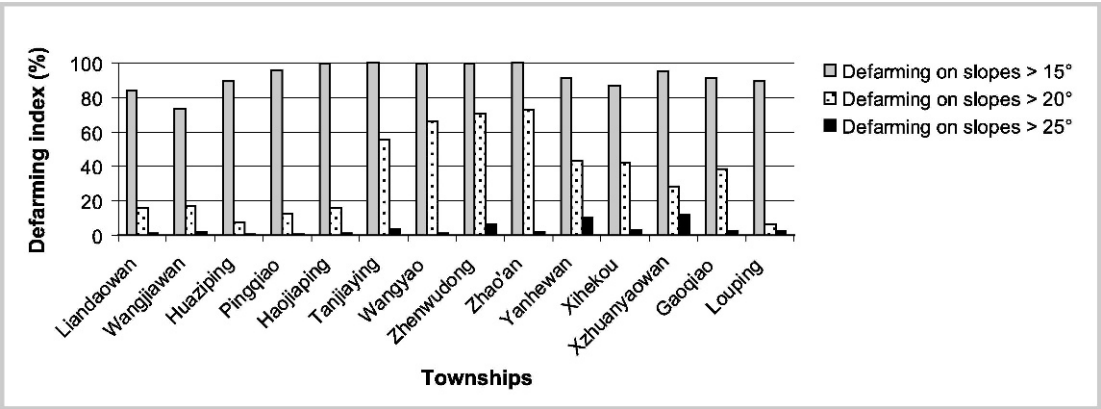


TABLE 2 Subsidy demand for defarming of the 14 townships in Ansai County according to 3 main slope classes.

Township	>25° (10^4 yuan)			>20° (10^4 yuan)			>15° (10^4 yuan)		
	Construction	Subsidies for 8 years of grain	Management for 8 years	Construction	Subsidies for 8 years of grain	Management for 8 years	Construction	Subsidies for 8 years of grain	Management for 8 years
Liandaowan	7.91	177.26	25.32	98.21	2199.93	314.28	523.44	11,725.01	1675.00
Wangjiawan	7.20	161.21	23.03	76.14	1705.59	243.66	324.86	7276.94	1039.56
Huaziping	4.44	99.36	14.19	83.24	1864.62	266.37	952.20	21,329.26	3047.04
Pingqiao	8.83	197.87	28.27	122.06	2734.17	390.60	954.92	21,390.15	3055.74
Haojiaping	5.91	132.32	18.90	80.66	1806.74	258.11	492.91	11,041.28	1577.33
Tanjiaying	16.86	377.66	53.95	273.48	6126.05	875.15	492.08	11,022.56	1574.65
Wangyao	7.52	168.52	24.07	427.09	9566.71	1366.67	643.49	14,414.27	2059.18
Zhenwudong	35.02	784.41	112.06	372.33	8340.21	1191.46	525.52	11,771.68	1681.67
Zhao'an	10.24	229.47	32.78	378.15	8470.48	1210.07	518.60	11,616.61	1659.52
Yanhewan	68.13	1526.04	218.01	284.25	6367.28	909.61	602.65	13,499.42	1928.49
Xihekou	13.93	311.93	44.56	212.71	4764.63	680.66	441.68	9893.64	1413.38
Zhuanyaowan	52.71	1180.69	168.67	127.01	2845.01	406.43	429.26	9615.53	1373.65
Gaoping	9.59	214.89	30.70	159.22	3566.46	509.49	379.94	8510.56	1215.79
Louping	10.54	236.14	33.73	26.57	595.24	85.03	354.04	7930.52	1132.93
Total	**258.83**	**5797.76**	**828.25**	**2721.12**	**60,953.10**	**8707.59**	**7635.60**	**171,037.42**	**24,433.92**

TABLE 3 Grain yield loss caused by defarming in the 14 townships of Ansai County according to the 3 main slope classes (unit: ton).

Township	>15°			>20°			>25°		
	Abundant year	Average year	Drought year	Abundant year	Average year	Drought year	Abundant year	Average year	Drought year
Liandaowan	4312.87	1931.67	1254.55	809.21	362.43	235.39	65.20	29.20	18.97
Wangjiawan	2676.72	1198.86	778.62	627.38	280.99	182.49	59.30	26.56	17.25
Huaziping	7845.66	3513.95	2282.19	685.87	307.19	199.51	36.55	16.37	10.63
Pingqiao	7868.05	3523.98	2288.70	1005.72	450.45	292.55	72.78	32.60	21.17
Haojiaping	4061.37	1819.03	1181.39	664.58	297.66	193.32	48.67	21.80	14.16
Tanjiaying	4054.49	1815.94	1179.39	2253.38	1009.25	655.47	138.92	62.22	40.41
Wangyao	5302.08	2374.72	1542.30	3518.97	1576.10	1023.62	61.99	27.76	18.03
Zhenwudong	4330.04	1939.36	1259.54	3067.82	1374.03	892.38	288.53	129.23	83.93
Zhao'an	4273.00	1913.81	1242.95	3115.74	1395.49	906.32	84.41	37.80	24.55
Yanhewan	4965.57	2224.00	1444.41	2342.11	1049.00	681.29	561.33	251.41	163.28
Xihekou	3639.23	1629.96	1058.60	1752.60	784.96	509.81	114.74	51.39	33.38
Zhuanyaowan	3536.93	1584.14	1028.84	1046.50	468.71	304.41	434.30	194.52	126.33
Gaoping	3130.49	1402.10	910.61	1311.87	587.57	381.60	79.04	35.40	22.99
Louping	2917.13	1306.54	848.55	218.95	98.06	63.69	86.86	38.90	25.27
Total	**62,913.62**	**28,178.06**	**18,300.65**	**22,420.71**	**10,041.90**	**6521.86**	**2132.62**	**955.17**	**620.35**

the subsidies for defarming were suspended, the subsidy policy for defarming should not be suspended; instead, it should be extended into the following 3–5 years. By the end of 2007, the central government of China made a decision: the ecological defarming policy will be continued after 2008.

ACKNOWLEDGMENTS

Research for this study was supported by the Knowledge Innovation Project of the Chinese Academy of Sciences (grant no. KZCX2-XB2-05-01), the National Science and Technical Support Project of China (grant no. 2006BAD09B10-2), and the National Natural Science Foundation of China (grant no. 40771086).

The authors are grateful to Zhaoxin for her language editing; they would also like to thank the two anonymous reviewers for their useful comments and suggestions about the paper.

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