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## Extent, Causes and Impacts of Land Degradation in PRC

### Extent

The total area of degraded land in PRC is still being debated and is often confused by differences in definitions. Out of the not officially sanctioned 466 million hectares (according to UNEP/FAO – Table 1) of degraded land in PRC, some 330 million hectares (or 35 percent of the country's surface area) is affected by desertification.

The Institute of Remote Sensing Applications (IRSA) of the Chinese Academy of Sciences conducted a comprehensive soil erosion survey in 1999, combining remote sensing (Thematic Mapper false color – bands 4, 3, and 2), GIS, GPS, and field surveys. They used a manual ranking into 5 classes covering 2,367 counties. Each field survey site has a GPS location and a digital camera image (more than 8,000 pictures), allowing for future comparisons. Soil erosion maps have been prepared at 1:35,000 and 1:250,000 scales, with 7 river basin maps. Based on preliminary assessment in 2000, IRSA found that out of the total land area of 950 million hectares, 479 million, or 50 percent is affected by land degradation to some degree.

Since the early 1950s, some 7.7 million hectares of arable land and 105 million hectares of rangeland, steppe and desert steppe have been degraded by serious desertification. Some 400 million people are now threatened by desertification. The rate of annual mean spread of desertification has increased in the last three decades - from about 156,000 hectares in the 1960s, 210,000 hectares in the 1970s, and to 240,000 hectares in the 1990s.

**Table 1 Soil Degradation in PRC by Degradation Type**

		(million hectares)				
Type of Degradation		Negligible	Light	Moderate	Strong	Extreme
Water Erosion	Loss of Topsoil (Wt)	15.8	105.9	44.9	3.8	0.2
	Terrain Deformation (Wd)	0.5	7.9	5.9	24.0	-
	Off-site Effects (Wo)	0.2	0.2	0.2	-	-
Wind Erosion	Loss of Topsoil (Et)	1.7	65.9	2.5	+	+
	Terrain Deformation (Ed)	+	7.2	5.5	57.9	-
	Off-site Effects (Eo)	+	2.0	6.5	0.2	-
Chemical Deterioration	Fertility Decline (Cn)	32.4	31.7	4.8	-	-

	Salinisation (Cs)	0.5	6.8	2.6	-	-
	Dystrification (Ct)	-	+	-	-	-
Physical Deterioration	Aridification (Pa)	-	23.7	-	-	-
	Compaction and Crusting (Pc/Pk)	-	0.5	-	-	-
	Waterlogging (Pw)	3.8	-	-	-	-
Total Degradation	All Types	55.0	251.9	72.9	86.0	0.25

Source: Lynden, G.W.J. / Oldeman, L.R. (1997): *The assessment of the status of human-induced soil degradation in South and Southeast Asia*. United Nations Environment Program (UNEP), Food and Agricultural Organization of the United Nations (FAO), International Soil Reference and Information Centre (ISRIC), Wageningen, The Netherlands

Note: (-) no significant occurrence; (+) Less than 0.1 but more than 0.01 million hectares;  
for calculation of the totals it is assumed that (+) is equivalent to 0.05 million hectares.

Land degradation affects most provinces, while desertification is concentrated in 13 provinces in the northern, northeastern, and northwestern regions (the three north regions) lying in the arid, semi-arid, and dry sub-humid zones. Annual soil loss is estimated at 5 billion tons (t). Dust storms affect a wide area, including Beijing, with the nearest shifting dunes less than 100 km from the capital city. Sand invasion and dune movement have buried some 670,000 hectares of arable land and 2.35 million hectares of rangeland and steppe areas.

Using the strict UN Convention to Combat Desertification (CCD) definition of desertification (i.e. confined to arid, semi-arid, and arid sub-humid areas), statistics from the State Forest Administration (SFA) estimate the desertified area at 262.2 million hectares, or 28 percent of the country's land, expanding at a pace of 246,000 hectares annually. SFA has printed an atlas of the desert locations in 30 provinces, municipalities and autonomous regions, showing nearly 400,000 patches in over 7,500 townships. Of the desertified land, 160.7 million hectares are affected by wind erosion, 20.5 million hectares affected by water erosion, 23.3 million hectares salinized, 36.3 million hectares affected by freeze and thaw erosion, and 21.4 million hectares affected by other desertification processes.

In relation to the regional distribution of desertification, 61.3% is caused by wind erosion and 97.8% of that is distributed in just 5 provinces: Xinjiang (42.0%), Inner Mongolia (34.2%), Gansu (9.5%), Xizang (Tibet) (7.0%) and Qinghai (5.1%). Within those provinces three regions are mainly affected:

- (i) Ecotone of farming and pastoral area, accounting for 40.5% of desertification in north PRC, mainly on arable land within former grassland areas;

- (ii) Grassland in arid, undulating sandy area, accounting for 36.5%; and
- (iii) Edge of oases and lower reaches of inland rivers in drought affected areas, accounting for 23.0%.

Grasslands cover about 400 million hectares (over 40% of the country's surface area). Some 75% of PRC's grasslands are found in Xizang, Inner Mongolia, Xinjiang and Qinghai in the semi-arid pastoral areas. Grassland ecosystems support a suit of genetic resources and are a potential source for pharmaceuticals and industrial products. They are also able to store considerable quantities of carbon. Grassland degradation is regarded as the most significant and serious land management problem in PRC at present. Arid and/or cold temperature makes this dryland ecosystem particularly susceptible to degradation and slower to recover from improper land uses and interventions. Some 135 million hectares (or 34%) of grasslands are moderately to severely degraded. Overall trends show a steep increase from some 65 million hectares of affected areas in the period 1989–1992, up to some 130 million hectares in 1997.

About 180 million hectares of land in PRC suffers from soil erosion, resulting in about 5 million m<sup>3</sup>/yr of surface soil loss. Serious soil erosion causes land degradation, decreased productivity, and even base rock exposure. Increased sedimentation in rivers and lakes results in frequent flood disasters, which destroy the ecological system, threaten people's lives and property, and restrict the development of agriculture and the national economy. Twenty five percent of the national poverty counties are concentrated in seriously eroded areas. The soil eroded area in the Yangtze Valley is about 551,800 km<sup>2</sup>, accounting for 36.2 percent of the total eroded area in PRC. The soil eroded totals about 2.4 billion t/yr, mostly distributed in the upper regions. Millions of hectares of land are degraded every year, causing massive losses of useful land for agriculture.