

表 5 - 10 影響とミティゲーション 3 / 5

Impacts		Mitigation Measures
E. Wuhu Shanjiang Chemicals Limited Company		
1. During Construction		
Fugitive dust emission during construction.		Construction sites will be sprayed with water.
Noise disturbance during construction.		Use low noise equipment, operate noisy equipment only during certain hours, and use sound protection equipment and antivibration devices.
Disruption of factory appearance and vegetation.		Revegetate.
2. During Operations		
Item	Source	Waste
Waste Gas	Membrane process caustic soda	Chlorine and brine tower wastage
	Liquid chlorine And hydrochloric Acid refining	Liquid chlorine
Waste water	Chlorinated polyethylene	Chlorine gas
	Industrial boiler	Dust
	Ion-film alkali	Flue gas, SO ₂ , NOx
	Caustic soda unit and chlorine production workshop	Sodium chlorinate, acid or alkali
Solid waste	Polyethylene and similar production lines	Acidic wastewater containing dilute hydrochloric acid, mercury, COD, SS, CPE
	Domestic and lab waste water	Acidic wastewater containing dilute hydrochloric acid, caustic soda, sodium chlorinate
	Wastewater Treatment plant	COD, BOD
Noise	Boiler house	Brine mud, slag, slurry mud
	Noisy equipment	Coal ash
F. Wuhu Zhengxing Materials Limited Company		
1. During Construction		
Fugitive dust emission during construction.		Construction sites will be sprayed with water.
Disruption of factory appearance and vegetation.		Trees will be planted along the two sides of main roads, and cold-resistant sod swale will be planted in the blank area.
Noise disturbance during construction.		Construction will be conducted during daylight hours.
Influence on transportation inside the factory.		Construct 8 m wide and 4 m wide paved roads.
2. During Operations		
Item	Source	Waste
Waste Gas	Sintering machine	SO ₂ , dust
	Liquid iron Treatment	Dust
Waste Water	Blast furnace gas	Dust
	Domestic wastewater	COD, BOD
	Cooling water	
	Water pressure test, cement lining, and Tube wall grinding	
	Blast furnace gas	Gas wash water
Coking Sewage		

出所：ADB (2001a) p. 25

表 5 - 11 影響とミティゲーション 4 / 5

Impacts		Mitigation Measures	
Solid Waste	Foundry center	Waste sand and dust	Transported to outside for comprehensive use
	Sewage treatment plant	Sludge	Transported to outside for comprehensive use after filtered
Noise	High noise equipment		Noise silencer, sound proofing, violation buffering and noise barriers will be applied
G. Huangshan Tourist Group Limited Company			
1. During Construction			
Removal of vegetation and soil.		Revegetate at another location – 1 ha for every ha lost.	
Covering of vegetation with waste rock and soil.		Transplant trees and plants that will be impacted. Fence known sensitive species.	
Endangered plant species.		During construction, all areas will be controlled to minimize effects to the terrain – (i) minimize time where soil is exposed on side slopes; (ii) provide retaining walls; (iii) construct trenches for water drainage; (iv) do not allow (a) explosions, (b) construction during the rainy season, or (c) storage of construction equipment outside of the construction area.	
Soil erosion.		Temporary toilets will be collected and waste treated biologically, with no discharge to local water sources.	
Domestic wastewater.		All wood materials will be inspected for pine eel worm. Best management practices will be employed.	
Pests.		Use of electric and gas welding will be minimized.	
Dust from construction activities.		Best management practices will be employed.	
Fire.			
Noise.			
2. During Operations			
Item	Source	Waste	
Waste Gas	Wastewater treatment plant incinerator	Dust, SO ₂ , chlorine	Select a furnace with pollution control devices that will minimize pollutant emissions. Odor control design according to national and local standards and approved by local environmental protection bureau
Waste Water	Wastewater treatment plant	Domestic sewage	Treated and discharged
Solid Waste	Wastewater treatment plant	Sludge	Treat and use as fertilizer on the outskirts of the scenic area
Noise	Pump stations, water purification company		Use of sound proofing materials in building, double layered glass for windows
H. Jihua Tourism Group Company			
1. During Construction			
Removal of vegetation and soil.		Revegetate where possible.	
Endangered plant species.		Transplant trees and plants that will be impacted. Fence known sensitive species.	
Soil erosion.		Revegetate where possible.	
Domestic wastewater.		Treat temporarily in septic tanks, pile collectively, and transport to landfill at regular intervals.	
Dust from construction activities.		Best management practices will be employed.	
Noise.		Use noisy equipment only away from residential areas.	
2. During Operations			
Item	Source	Waste	
Waste Gas	Wastewater treatment plant incinerator	Dust	TSP emissions controls
	Sewage pump stations, aeration tank, condensation tank	Odor	Odor controls designed according to national standards and approved by local environmental protection bureau
Waste Water	Wastewater treatment plant	Domestic sewage	Treated and discharged; primary and secondary treatment required

出所：ADB (2001a) p. 26

表 5 - 12 影響とミティゲーション 5 / 5

Impacts		Mitigation Measures	
	Incinerator	Wastewater	Biochemically treated at Kecun Sewage Treatment Plant
Solid Waste	Wastewater treatment plant	Sludge	Treat and use as fertilizer on the outskirts of the scenic area, depending on the metals concentrations
	Garbage treatment station	Sludge	Burn and fill
	Garbage filling Station	Sludge	Treat with the antifiltering method
Noise	Pump stations, water purification Company		Use sound proofing materials in building. Plant trees and vegetation for sound reduction.

ACR=acrylate polymer; BOD=biological and ecological demand; CPE=chloridize polyethylene; COD=chemical oxygen demand; ha=hectare; m=meter; NOx=nitrogen oxide; SO₂=sulfur dioxide; SS=suspended solids; TSP=total suspended particulates.

Source: Consultants (Ecology and Environment, Inc, United States)

出所：ADB (2001a) p. 27

(4) まとめ

プロジェクトの目的は公害対策の側面が強く、結果はおおむね妥当なものであり、特段地元住民からの反対意見は出なかったようである。プロジェクトの目的がすでに悪化している環境を改善するものであり、「環境への悪影響を最低限に止める」というアセスメントの観点からは評価のむずかしいプロジェクトであるが、代替案検討が充実していたため参考として取り上げた。ADBの他の報告書では必ずといっていいほど設けられている「住民参加」の章がこの報告書では省略されているのは、こうしたことが理由かもしれない。また、このようなプロジェクトの性質をふまえて、“detailed environmental assessment or analysis is unnecessary”と最後に結んでいる。

表 5 - 13 汚染物質削減の見込み

Estimated Pollution Reductions from Cleaner Production Subprojects

Pollutant	ATC	CNM	WFW	WHC	WSC	WZM	Total or Average Percentage
Emissions (reduction due to Project)							
SO ₂ (t/yr)							
Urban Area Emissions before Project (1998) ^a	38,693	10,273	22,800				71,766
Reduction due to Project	14,890	6,040	1,372	1,952	4,533	2,545	31,332
Urban Area Emissions after Project	23,803	4,233	12,398				40,434
Reduction at Subproject Source	83%	96%	98%	59%	91%	62%	82%
Reduction in Urban Area ^a	38%	59%	46%				44%
CO ₂ (t/yr)							
Urban Area Emissions before Project (1998) ^a	3,595,387	1,370,981	5,641,442				10,607,810
Reduction due to Project	92,928	40,747	109,463	15,368	40,480	177,819	476,805
Urban Area Emissions after Project ^a	3,502,459	1,330,234	5,298,313				10,131,006
TSP (t/yr)							
Urban Area Emissions before Project (1998) ^a	28,927	11,030	45,368				85,325
Reduction due to Project	1,604	328	592	858	328	1,240	4,950
Urban Area Emissions after Project ^a	27,323	10,702	42,350				80,375
NO _x (t/yr)							
Urban Area Emissions before Project (1998) ^a	12,992	4,954	20,386				38,333
Reduction due to Project	336	147	396	56	146	643	1,723
Urban Area Emissions after Project ^a	12,657	4,807	19,146				36,610
WASTEWATER (reductions due to Project)							
Total Mass (t/yr)	5,128,900	511,800	624,000	1,360,760	1,350,000	6,096,000	15,071,460
COD			713		1471	288	2,472
BOD			574		143		717
SS			422		126	4,379	4,927
Phenol			60		2.67	89	152
Arsenic	177.8	2.87					181
Lead		18					18
SOLID WASTE (reductions due to Project)							
Coal Use (t/yr)							
Urban Area Consumption Before Project ^a	1,225,700	467,380	1,923,219				3,616,299
Equivalent Reduction due to Project	31,680	13,891	37,317	5,239	13,800	60,620	162,547
Urban Area Consumption after Project ^a	1,194,020	453,489	1,806,243				3,453,752
Average Sulfur Content of Coal	1.00%	1.06%	1.50%	1.50%	1.50%	1.50%	

ATC: Anhui Tongdu Copper Limited Company ; BOD=biological oxygen demand; CNM=Chizou Non-Ferrous Metals Group Company; COD=chemical oxygen demand; CO₂=carbon dioxide; NO_x=nitrogen oxide; SO₂=sulfur dioxide; SS=suspended solids; t/yr=tons per year; TSP=total suspended particulates; WFW=Wuhu Felying Wood Chemicals Limited Company; WHC=Wuhu Hengxin Copper Group Company; WSC=Wuhu Shangjiang Chemicals Limited Company; WZM=Wuhu Zhengxing Materials Limited Company

^a Figures are given by city, hence only one entry is given for subproject enterprises in Wuhu.

Source: Consultants (Ecology and Environment, Inc., United States)

出所: ADB (2001a) p. 20

5-1-2 事例2：Harbin water supply project（中国）

(1) プロジェクト概要

本プロジェクトは、哈爾濱（Harbin）市周辺での深刻な水不足と水質改善を目的としたものである。プロジェクトの中止を含め、水の浄化方法から運搬方法、浄化施設の立地選定まで幅広い代替案が検討されている。そして、これらの代替案は事前の入念な地元住民の意識調査に基づいて策定されたことが記述されている。

(2) 環境の状態

対象地域の年間降水量は 650 mm で、それらの 70 %以上が 6～8月のものである。主な水源は Lalin 川だが非常に不安定であり、10年に一度は壊滅的な洪水をひき起こす。貯水池の建設で洪水を軽減することにより、1年を通じて 1 m³/s以上の流量が確保できるといわれている。哈爾濱（Harbin）市を通過する Songhua 川は、流域内のすべての排水の行き着く場所となっているため水質汚染が進んでいる。中国では水質を 1から5のクラスに分けており、1と2は飲み水として使える水質で、3は浄化すれば1や2に匹敵する水質に改善できるもの、4および5は水質汚染のひどいものとされている。Songhua 川はクラス4に分類されており、浄化キャンペーンなどが行われたものの、楽観的に見積っても 2015年までは使える水質にはならず 2019年までは要するといわれている。また地下水の使用量が水位レベルを維持できる量を超えており、地域の地盤に悪影響を与えている。

流域の生態系、社会環境は表 5-14 のとおりである。

表 5-14 生態系

Ecological Resources of the Project Area		
Category	Type	
Flora	Trees	Dragon spruce, fir, elm, Chinese linden, Mongolian oak, poplar, white birch, lilac tree, clumps of multiflora rose, cypress, peach, plum, Korean pine
	National protected plants ^a	Wilsonii, rhizoma gastrodiae, northeast China ash, Manchurian walnut, pinus sylvestris var. mongolica, amur cork-tree
	Plants for Chinese medicine	Hairy asiabell, Chinese magnoliavine, Rhododendron dauricum, carthami, Fritillariae Ussuriensis, plantain seed
	Fungi	Edible tree fungi, parasol mushroom, hazel mushroom, hedgehog hydnum
	Aquatic flora	Reed and other aquatic grasses
Fauna	Fishes	Carp, crucian, catfish, loach
	Protected animals ^a	Wolf, yellow weasel, roe, squirrel
	Birds	Gray magpie, black-headed grosteak, hill turtledove, sparrow, barn swallow, red-rumped swallow, big-mouth crow, mallard, gray wagtail, water ouzel, kingfisher, woodpecker
	Animals	Mandschurian hare, sewer rat, small house mouse, striped field rat, grass hare, muskrat
	Aquatic fauna	Frog, back-brighted toad
Agriculture	Livestock and poultry	Pig, cattle, chicken, horse, donkey, goose, duck
	Major crops	Rice, maize, soybean
	Cash crops	Vegetables, herbal medicine
	Fruits	Pear

^a The listed protected flora and fauna are not endangered species

Source: Heilongjiang Environmental Protection Bureau.

出所：ADB（2002a）p. 12

表 5 - 15 社会環境

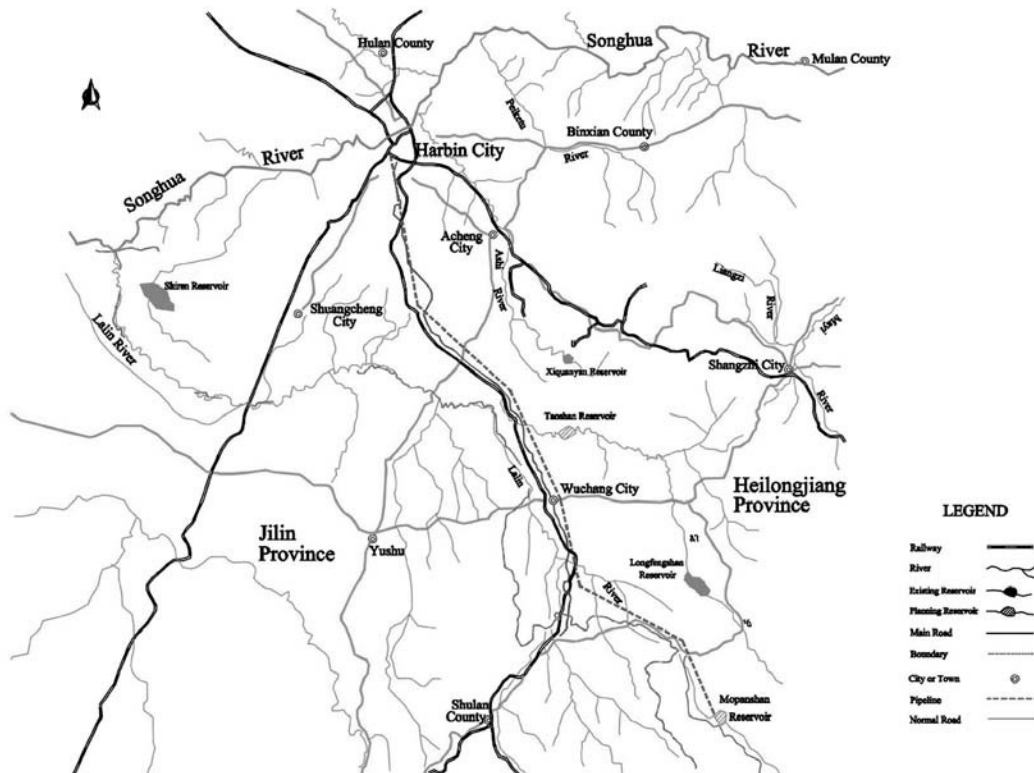
Major Social and Economic Conditions

Indicator	Units of Measure	Values
Total Population	Person	9,413,300
Urban Population	Person	3,481,200
Total Area	km ²	53,060
Urban Area	km ²	1,660
Gross Domestic Product (GDP, 2000)	Yuan	100,270,000,000
Income per Urban Resident (2000)	Yuan/year	5632
Income per Farmer (2000)	Yuan/year	2477
Potable Water Supply (urban)	m ³ /d	1,000,000
Urban Area Potable Water Supply	%	60
Urban Area Wastewater Treatment	%	30
Higher Education Institutions	Number	60
Major Highways	Number	10
Major Railways	Number	5
International Airports	Number	1
Others	—	Major tourist and heavy industrial (E&M equipment) city in PRC

出所：ADB (2002b) p. 14

(3) 施設の詳細

図 5 - 2 プロジェクト対象地域地図



出所：ADB (2002b) p. 4