

2012 STATE OF THE COASTS OF MASAN BAY



CHANGWON



Bongam Tidal Flat



2012
STATE OF THE COASTS
of Masan Bay



Partnerships in Environmental Management
for the Seas of East Asia (PEMSEA)





Community Advisory Council for Masan Bay



Message

Changwon is located in the southeastern part of Korea. On July 1st, 2010, Changwon merged with the neighboring cities of Masan and Jinhae to become a city with 1.1 million residents. The Masan Bay, in which national economic growth of Korea took its place since the beginning of 1970, got drastically polluted due to the industrialization and urbanization.

The city, along with the public and other experts from academic, industrial and administrative parties, declared itself an environmental capital with economically sound and sustainable development. The Special Management Area of Masan Bay has enabled the concerned government agencies to implement projects, to mitigate pollution, to rehabilitate already polluted areas, and to take preventive and remedial actions. Several projects such as environmental infrastructure, including wastewater treatment plants and sewer lines, have been installed, and dredging process had been applied to the contaminated sediments of Masan Bay.

In 2004, through the consultation with private sectors of the Bay area, an agreement was achieved from the stakeholders of the Bay to formulate the Comprehensive Management Plan for the Masan Bay which includes the introduction of the TPLMS (Total Pollution Loads Management System). The Plan envisioned restoring the water quality of Masan Bay to Level II (COD range of 1 - 2 mg/L) through the implementation of our rigorous and science-based management tool, the TPLMS as one of Integrated Coastal Management. In this light, we sense the success of the TPLMS implementation in Masan Bay and also see a cleaner and safer Bay.

In 2012, Changwon successfully hosted the "EAS Congress" which was a wonderful showing of the maritime harmony of East Asian countries.

Most of us take the benefit of nature for granted. Even though we recognize we are losing the biological diversity on earth. Decision making in local government should, whenever possible, give priority to well-functioning habitats. More concerns and actions from Changwon city are still required to preserve urban tidal flats, to create waterfront spaces eco-friendly, and to keep the coastal line intact. Community involvement is the most important in raising awareness, training and educating the public and government officials, facilitating local government work, and encouraging responsibility and stewardship for coastal resources.

Community Advisory Council for Masan Bay seeks integrated networking of social values as well as international cooperation through PNLG and EAS Congress to build up the capacity for making necessary changes to sustainability.

I hope you find this information on the Changwon and the Masan Bay in this SOC Report of Masan Bay useful, and hope the PEMSEA network will serve as a venue to exchange information necessary to build on the blue economy of marine and coastal resources throughout the entire East Asian Seas region.

Thank you very much and best wishes!

Prof. Chan Won Lee
Chairman of Community Advisory Council
for Masan Bay

미찬원





Message

I would like to commend the City Government of Changwon and its partner academe, nongovernment organizations and relevant stakeholders for their commitment and effort in preparing the first State of the Coasts Report for Masan Bay.

This SOC report provides a comprehensive assessment of the socioeconomic and environmental status of Masan Bay, including the management interventions and implementing arrangements that have been put in place for the sustainable development of the Bay. The effectiveness and success of the Masan Bay management program can only be properly evaluated through systematic data gathering and analysis, as well as stakeholder consultation and participation. This two-pronged approach to the SOC reporting system is important in order to determine both the changes that are occurring in the Bay's ecosystem and the people's perspectives and perceptions of the value and benefits of those changes and the management program itself.

The Total Pollution Load Management System (TPLMS) for Masan Bay includes essential components of an integrated management system namely: a) governance elements, including enabling policies and legislation, multisectoral coordinating mechanism (i.e., Community Advisory Council for Masan Bay); b) a platform for stakeholder participation and awareness building; c) a capacity development agenda; and d) financing arrangements and mechanisms in support of the program operation, as well as capital investments. At the same time, the TPLMS addresses the threats to the sustainability of ecosystem products and services of Masan Bay, particularly pollution, natural and man made hazards, unregulated coastal developments and degradation of habitats.

As highlighted in the report, there has been significant progress towards achieving the TPLMS targets for the water quality of Masan Bay. The commitment of the Government of RO Korea and the City Government of Changwon, with strong support from relevant stakeholders, academe, nongovernment organizations and private sector were instrumental in realizing these targets.

The SOC reporting system allows local government to track its progress towards achieving its sustainable development targets. To fully realize the objectives and benefits of the Masan Bay program, PEMSEA encourages the City Government of Changwon to incorporate the SOC reporting system into its regular monitoring and reporting process. This will serve as basis for the continual evaluation and refinement of the TPLMS program and, ultimately, facilitate the achievement of the sustainable development targets for Masan Bay.

The Masan Bay SOC report contains information that I believe is of great value to the general public, environmental managers and policymakers of Changwon, all of whom have a stake in the sustainable development of Masan Bay.

Congratulations!

Stephen Adrian Ross
Acting Executive Director
PEMSEA Resource Facility





C·o·n·t·e·n·t·s

Message

TABLE / FIGURE LIST

List of Abbreviations and Acronyms

Community Advisory Council for Masan Bay

Acknowledgements

Introduction Of State of the Coasts Report	11
What is Integrated Coastal Management?	11
What is a State of the Coasts Report?	11
Who is the SOC target audience?	12
What are the main elements of the SOC report?	12
Guide to SOC Development	13
Core Indicators for SOC Reporting for Masan Bay in Changwon	15
Executive Summary	18
Introduction to Masan Bay and Changwon City	24
History of Changwon	24
History of Masan Bay	26
Water quality deterioration	27
Ecosystem Recovery in Masan Bay	27
Key Facts about Changwon	28
Indicators	30
Policy, Strategies, and Plans	30
Institutional Arrangements	39
Legislation	44
Information and Public Awareness	53
Capacity Development	62
Financing Mechanisms	66
Natural and Man-made Hazard	70
Habitat Protection, Restoration, and Management	80
Water Use and Supply Management	100
Food Security and Livelihood Management	104
Pollution and Waste Management	117

TABLE

Table 1	Coastline and Islands	28
Table 2	Information of Coastline and Islands	28
Table 3	Population trend of Changwon city	29
Table 4	Environmental issues in Masanbay	36
Table 5	Masan Bay TPLMS process in the CAC meetings	43
Table 6	Status of illegal fishing cases reported around Changwon in 2011.	49
Table 7	Marine pollution reported cases in Korea in 2011.	51
Table 8	Cases reported via marine pollution penalties in Korea	51
Table 9	Cases reported via marine pollution accident in Gyeongnam province	52
Table 10	NGOs, NPOs, and Governance organizations related to coastal environment	61
Table 11	Access to facilities and training programs in ChangWon	63
Table 12	The Korean government's budget allocation for marine environment (2009-2012)	67
Table 13	Criteria for disaster breaking news in Changwon City	72
Table 14	Guidelines based on different disaster stages and situations in Changwon City	73
Table 15	Number of visitors to Bongam mud flat and its maintenance expenses	86
Table 16	Water supply information of Changwon City	91
Table 17	Ordinances for rainwater management in Changwon	94
Table 18	Waterborne Disease Outbreaks in Changwon City.	100
Table 19	Present status of water-borne infectious diseases in Changwon	101
Table 20	Current status of fishery resources projects	105
Table 21	Minimum cost of living per household in 2010	115
Table 22	Changes in the number of recipients of the National Basic Livelihood Security in Changwon	116
Table 23	Change in Water Quality of Masan Bay	124
Table 24	Air Pollutant Emission in Changwon	134
Table 25	Sewerage Population and Distribution rate	137
Table 26	Volume of solid waste received in landfills/dump site	138
Table 27	Assessment table for public evaluation on collection and transportation of domestic wastes.	140
Table 28	Waste Generation in Changwon City	142
Table 28	Generation, Treat and Disposal of Industrial wastes in Changwon city	144
Table 29	Status of municipal waste Generation and treatment in Changwon city	145

FIGURE

Figure 1	Location of Changwon	24
Figure 2	Location of Masan Bay	26
Figure 3	Coastline and Islands in Changwon	28
Figure 4	Spatial Distribution of Population in Changwon	28
Figure 5	Population Trend in Changwon(2001-2012)	29
Figure 6	Location of Masan Bay.	31
Figure 7	Reclamation projects around Masan Bay area	32
Figure 8	Geographical Features of Masan Bay.	33
Figure 9	Masan Bay Management Boundaries.	36
Figure 10	Dynamic Evolution of Environment Management For Masan Bay.	36
Figure 11	Summary of TPLMS(total pollutant load management system) For Masan Bay.	38
Figure 12	Changed development projects were reviewed by public after establishment of 1st Masan Bay TPLMS in New 2008.	38
Figure 13	TPLMS Frame work For Masan Bay.	40
Figure 14	Organizational Chart of CAC For Masan Bay.	42
Figure 15	Institutional Development of ICM Policies in Korea	45
Figure 16	Overview map of designated coastal area in Changwon City	46
Figure 17	Harvesting clams in Masan bay	48
Figure 18	Status of marine pollution reported and fine imposed cases	50
Figure 19	Occurrence of marine pollution accidents	52
Figure 20	Council Public Awareness Programme For Masan Bay.	54
Figure 21	Program at Kyungnam University Program at Kyungnam University (Graduate School Program)	65
Figure 22	Still cut of Masan Bay conservation campaign broadcasted through Gyeongnam MBC	69

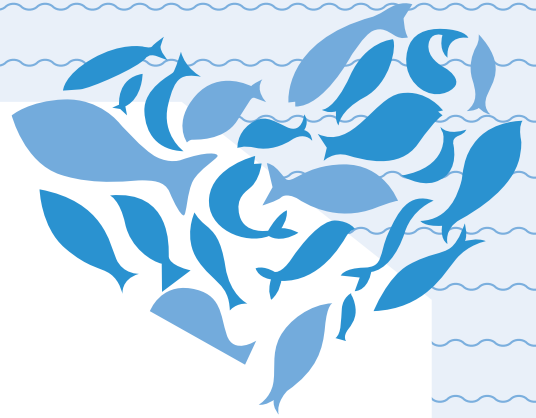


Figure 23	Gyeongnam Bank's Gagopa Love Credit Card	69
Figure 24	Changwon National Emergency Safety Center Service (Smartphone App)	71
Figure 25	Areas vulnerable to flooding due to typhoon, heavy rain and tsunami	75
Figure 26	3D map of submerged area in Changwon due to typhoon, heavy rain and tsunami	75
Figure 27	Mimetic diagram of damaged area around Masan Bay due to super typhoon Maemi area	77
Figure 28	Local damages by of Masan Bay area typhoons	77
Figure 29	Number of people severely affected by natural disaster incidents	78
Figure 30	Number of flood victims by natural disaster incidents	78
Figure 31	Flooding area by natural disaster incidents	79
Figure 32	Financial damage caused by natural disaster incidents	79
Figure 33	Habitat protection Area in Korea	80
Figure 34	Wetland protection Area in Korea.	81
Figure 35	Tidel flat in Changwon.	81
Figure 36	Ecological map of Bongam mud flat around Masan Bay	82
Figure 37	Urban (Masan Bongam) Tidal Flat in Masan Bay	84
Figure 38	Citizen Science monitoring in Masan Bay(Masan Bongam Tidal Flat)	84
Figure 39	Changes in the number of visitors to Bongam mud flat	87
Figure 40	Bongam mud flat maintenance expenses	87
Figure 41	Bongam mud flat monitoring expenses	87
Figure 42	Reclamation of Masan Bay	89
Figure 43	Air view of riverbank filtration development site	91
Figure 44	Full Time Monitoring (24 hours water quality monitoring system)	93
Figure 45	City water service center promotion material	94
Figure 46	Changwon YMCA rainwater bank	94
Figure 47	Rainwater facilities in Yongji Cultural Park	94
Figure 48	Nam Stream restored for effective water	94
Figure 49	Present status of water-borne infectious diseases in Changwon (2001-2011)	101
Figure 50	Fishery market	106
Figure 51	Fisheries Production (M/T)	107
Figure 52	Fisheries Production	107
Figure 53	Number of undernourished people in Changwon(1998-2009)	108
Figure 54	The Plan of Livelihood Security System in Changwon	111
Figure 55	The economically active population in Changwon	112
Figure 56	The Employment Rate of Changwon.	112
Figure 57	The Total number of School in Changwon	113
Figure 58	The Total number of Students in Changwon	113
Figure 59	The National Basic Livelihood Security recipients house	116
Figure 60	The National Basic Livelihood Security recipients	116
Figure 61	Monitoring site since 2006 by NFRDI	118
Figure 62	Monthly monitoring on water quality since 2006 by NFRDI	118
Figure 63	Monthly monitoring on marine debris from 2008 by Kyungnam University with NGO	119
Figure 64	No. of participants in International Coastal Clean-up Day Activities and collected marine litter amount	120
Figure 65	International Coastal Clean-up Day Activities in Masanbay	120
Figure 66	Coastal Clean-up Manual in Masanbay	120
Figure 67	Change in Water Quality of Masan Bay	122
Figure 68	Spatiotemporal distribution of COD budget in Masan Bay,	123
Figure 69	Change in Water Quality of Masan Bay(COD)	124
Figure 70	Change in Water Quality of Masan Bay(DO)	124
Figure 71	Monthly monitoring on stream water quality since 2005 by Kyungnam University.	125
Figure 72	Changes in COD Concentration in Woelyoung Stream (2005-2012)	125
Figure 73	Changes in COD Concentration in Janggun Stream (2005-2012)	126
Figure 74	Changes in COD Concentration in Chuksan Stream (2005-2012)	126
Figure 75	Changes in COD Concentration in Kyubang Stream (2005-2012)	127
Figure 76	Changes in COD Concentration in Samho Stream (2005-2012)	127
Figure 77	Changes in COD Concentration in Neadong Stream (2005-2012)	128
Figure 78	Changes in COD Concentration in Changwon Stream (2005-2012)	128
Figure 79	Changes in COD Concentration in Namchun Stream (2005-2012)	129
Figure 80	Changes in COD Concentration in Geajang Stream (2005-2012)	129
Figure 81	Changes in COD Concentration in Doodong Stream (2005-2012)	130
Figure 82	Changes in COD Concentration in Guee Stream (2005-2012)	130
Figure 83	Changes in COD Concentration in Shunee Stream (2005-2012)	131
Figure 84	Changes in COD Concentration in Deachun Stream (2005-2012)	131

Figure 85	Changes in COD Concentration in Jinhea wastewater treatment plant (2005-2012)	132
Figure 86	Changes in COD Concentration in Dukdong wastewater treatment plant (2005-2012)	132
Figure 87	Air Pollutant Emission in Changwon(Sulfurous acid gas)	134
Figure 88	Air Pollutant Emission in Changwon(Carbon monoxide)	134
Figure 89	Air Pollutant Emission in Changwon(Nitrogen dioxide)	135
Figure 90	Road cleaning by road flusher	135
Figure 91	Natural gas-fueled bus in operation for air quality improvement	135
Figure 92	Use of bicycles for air quality improvement(NUBIJA)	135
Figure 93	Change of Waste Generation in Changwon City	141
Figure 94	Change of Waste Landfill in Changwon City	141
Figure 95	Change of Waste Incineration in Changwon City	142
Figure 96	Change of Waste Recycling in Changwon City	142
Figure 97	Industrial Waste Electronic Commerce System in Changwon city	144

List of Abbreviations and Acronyms

BOD	Biochemical Oxygen Demand
CAC	Community Advisory Council for Masan Bay
Changwon CCI	Changwon Chamber of Commerce and Industry
CO	Carbon monoxide
COD	Chemical Oxygen Demand
CRERC	Coastal Resources and Environmental Research Center
DO	Dissolved Oxygen
GO	Governmental Organizations
HAB	Harmful Algal Bloom
ICLEI	International Council for Local Environmental Initiative
ICM	Integrated Coastal management
KORDI	The Korean Ocean Research and Development Institute
M&E	Monitoring and Evaluation
MCJKFEM	Masan-Changwon-Jinhae Korean Federation for Environmental Movement
MDG	Millennium Development
ME	Ministry of Environment
MLTM	Ministry of Land, Transportation and Maritime Affairs
NGO	Non-Governmental Organizations
NO ₂	Nitrogen dioxide
NOAA	The National Oceanic and Atmospheric Administration
Nubija	Nearby Useful Bike, Interesting Joyful Attraction: Bicycle sharing system in changwon City
OSEAN	Our Sea of East Asia Network
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
pH	Hydrogen ion concentration
ppm	Parts per million
SMA	Special Management Area
SO ₂	Sulfurous acid gas
SOC	State of the Coasts
TPLM	Total Pollution Load Management
TSS	Total Suspended Solid
WWTP	Wastewater Treatment Plant
YMCA	The Young Men's Christian Association
YWCA	The World Young Women's Christian Association



Acknowledgements

The State of the Coasts of Masanbay was initiated by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) in partnership with the ICM-Project Management Office and in collaboration with the following government agencies, nongovernmental organizations, the private sector and other stakeholders:

- Ministry of Oceans and Fisheries
- Province of Gyeongnam, Maritime Policy Division
- City of Changwon, Maritime Policy Division
- City of Changwon, Environmental Capital Division
- Masan Regional Maritime Affairs and Port Office
- Changwon Coast Guard
- Korea Maritime Institute
- Korea Institute of Ocean Science & Technology
- National Fisheries Research and Development Institute
- Kyungnam University
- Changwon National University

NGO and other stakeholders

- Masan, Changwon, Jinhae, Korean Federation for Environmental Movement
- Changwon Water and Life Civil Association
- Our Sea of East Asia Network, OSEAN
- Masan Young Men's Christian Association

The final output benefitted from the technical refinements of staff from the PEMSEA Resource Facility: Ms. Daisy Padayao, Technical Assistant for Project Development; Ms. Nancy Bermas-Atrigenio, Senior Country Programme Manager; with direction and guidance from Stephen Adrian Ross, Executive Director, PEMSEA Resource Facility.

Special thanks are due to Dr. Hong Pyo Jeon, Director of Community Advisory Council (CAC) for Masan Bay, for his collecting data and consulting with various stakeholders, and Ms. Hea-Jeong Jeong, layout artist, Team Director of Eco-Environment Design Institute CO., Ltd.



Introduction Of State of the Coasts Report

What is Integrated Coastal Management?

Integrated coastal management (ICM) is a natural resource and environmental management framework which employs an integrative, holistic approach and an interactive planning process in addressing the complex management issues in the coastal area. The ultimate purpose of ICM is to increase the efficiency and effectiveness of coastal governance in terms of its ability to achieve the sustainable use of coastal resources and of the services generated by the ecosystems in the coastal areas. It aims to do this by protecting the functional integrity of these natural resource systems while allowing economic development to proceed. Through integrated planning, ICM aims to address competing conflicts and conflicts arising from multiple use of limited space and resources (Chua, 2006).

What is a State of the Coasts Report?

The State of the Coasts (SOC) is a reporting system developed primarily to assess the progress and impacts of ICM implementation by local governments. Specifically, it aims to:

- a. Define the scope of issues being addressed in ICM;
- b. Delineate the governance mechanisms and implementing arrangements that have been put in place;
- c. Assess the extent and effectiveness of ICM program implementation;
- d. Identify trends or changes in the social, economic and environmental status of the area;
- e. Determine the driving forces for change;
- f. Assess the implications of the trends; and
- g. Promote adaptive management in ICM program implementation, in response to changing conditions.



Who is the SOC target audience?

The State of the Coasts report is intended for:

- a. Chief Executives of local governments;
- b. ICM managers;
- c. ICM practitioners; and
- d. Coastal communities and other stakeholders.

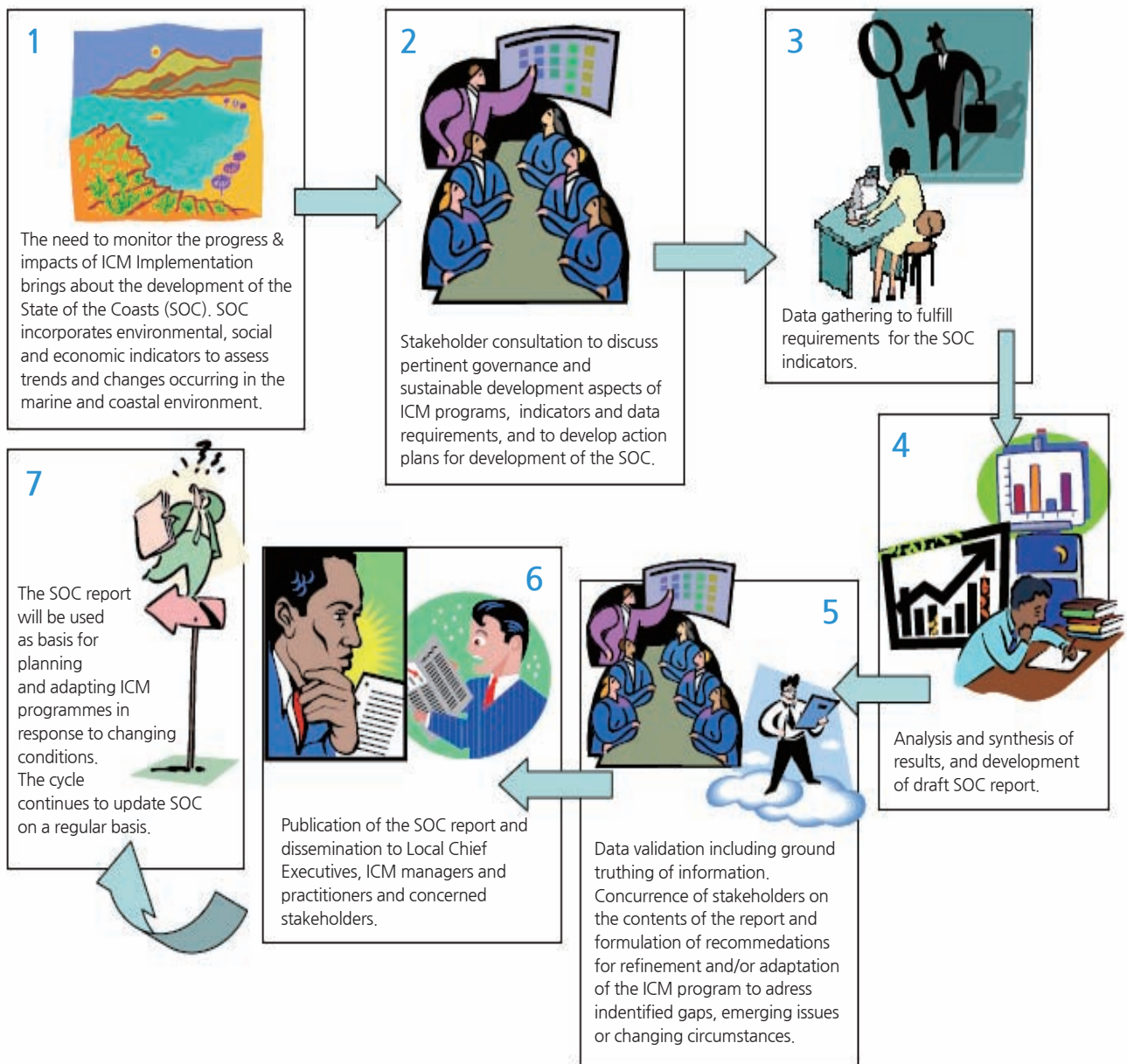
What are the main elements of the SOC report?

The SOC report contains the following:







- a. An Executive Summary featuring a fact sheet of the area, and a summary of key findings, implications and recommendations;
- b. A description of the relevance of various indicators of governance and sustainable development aspects of ICM programs based on a common framework for sustainable coastal development;
- c. The results and analysis of each indicator, including the implications of changing conditions and recommendations for mitigating measures, as agreed to by concerned stakeholders; and
- d. A description of the SOC methodology and process, the framework for sustainable coastal development, and the accomplished SOC reporting templates.

Guide to SOC Development

Development of the State of Coasts Report for Masan Bay in Changwon.



Core Indicators for SOC Reporting for Masan Bay in Changwon.

STATE	TREND
 GOOD	 Improving
 MODERATELY	 Maintaining
 BAD	 Deteriorating

SOC Code	Category	Indicator	Description	State	Trend
001	Policy, strategies and plans 정책 및 전략 계획 수립	Coastal profile and environmental risk assessment 연안해역 정보 / 해양환경영향 및 위해성 평가	- Law of Environment Impact Assessment - Marine Ecosystem Health Index in the special management areas in South Sea		
002	Policy, strategies and plans 정책 및 전략 계획 수립	Coastal strategy and action plans 해양환경 보전 실행 계획 수립	- Environmental Capital 2020 - TPLM - Robot land		
003	Policy, strategies and plans 정책 및 전략 계획 수립	Local government development plan integrating coastal and marine areas 지방정부 계발 계획 수립 (연안지역 포함)	- Reinvestigation and cancellation of large urban development plans - New town in the reclamation - New harbor construction		
004	Institutional arrangements 해양환경분야 제도적 협약 현황	Coordinating mechanism 협력 메카니즘	- Good coordinating mechanism		
005	Institutional arrangements 해양환경분야 제도적 협약 현황	Participation of stakeholders in the coordinating mechanism 이해당사자의 참여	- Active participation of stakeholders - Practices of stakeholders		
006	Legislation 해양환경분야 관련 법률 현황	ICM enabling legislation 연안역통합관리를 위한 법적 근거	- Amendment of ICM law - Law for TPLM		
007	Legislation 해양환경분야 관련 법률 현황	Administration and monitoring of compliance to legislation 연안관리지원 법률에 관한 집행과 모니터링	- Citizen Science Monitoring - Citizen evaluation for Environmental Capital projects		
008	Legislation 해양환경분야 관련 법률 현황	Environmental cases filed/resolved 해양환경관련 소송, 법정사건, 벌금 등	Cases resulting in penalties have decreased		
009	Information and public awareness 대중인식증진 사업에 관한 정보	Public education and awareness 연안환경대중인식 교육 사업 시행 여부	- TV Broadcasting - Forum, Conference, and Education Program		

SOC Code	Category	Indicator	Description	State	Trend
010	Information and public awareness 대중인식증진 사업에 관한 정보	Stakeholder participation and mobilization 이해당사자 참여와 기회 부여 정도	Activities in the International Clean-up day, Sea Day, etc.		
011	Capacity development 역량 개발	Availability/accessibility 가능성과 실현성	- Training programs and institutions for regional capacity building		
012	Capacity development 역량 개발	Human resource capacity 연안환경 관련 인력 현황	ICM Master course in Kyungnam University		
013	Financing mechanisms 재정 관계	Budget for ICM 연안 통합관리 계획 작성 예산 반영 여부	Environment management Masan Bay budget was 0.1 billion KRW in 2012		
014	Financing mechanisms 재정 관계	Sustainable financing mechanisms 지속가능한 재정 확보 여부	- Mostly from central government - Small grants from local government agencies on a case by case basis		
015	Natural and man-made hazard prevention and management 환경 피해 예방 제도 및 관리 정책	Level of preparedness for disasters	- Early warning and response system by smart phone application - Trained personnel and equipment available for all kind disasters		
016	Natural and man-made hazard prevention and management 환경 피해 예방 제도 및 관리 정책	Degree of vulnerability to disasters 환경 피해 민감도 조사	- Coastal Hazard Maps - City center developed along the coast.		
017	Natural and man-made hazard prevention and management 환경 피해 예방 제도 및 관리 정책	Social and economic losses due to disasters 환경 재난에 따른 사회 경제적 피해 현황 조사 여부	- The frequency of disasters loss is low - Construction plan still existed in the Bay		
018	Habitat protection, restoration and management 서식지 보호와 복원 및 관리	Habitat management plan and implementation 서식지 보호와 복원 및 관리 시행 계획 수립 여부	Habitat restoration in streams, tidal flat and sea area		
019	Habitat protection, restoration and management 서식지 보호와 복원 및 관리	Areal extent of habitats 서식지 면적의 크기	Recovery of Tidal Flats		
020	Habitat protection, restoration and management	Protected areas for coastal habitats and heritage 해양 서식처와 보호구역 설정 여부	- Decrease of Fishery Resource Protection Area because of development - New protected area		
021	Habitat protection, restoration and management	Reclamation and conversion 매립과 용도변경	Reclamation in Masan Bay		

SOC Code	Category	Indicator	Description	State	Trend
022	Water use and supply management 물 사용과 공급 관리	Water conservation and management 물 보호와 관리	National conservation and management		
023	Water use and supply management	Access to improved water source 수자원의 증접근	Unstable quality of water resource because of surface water		
024	Water use and supply management	Incidences/deaths due to waterborne diseases 수인성 질병에 의한 발병률/사망률	Less waterborne diseases detected		
025	Food security and livelihood management 식품안전과 생활관리	Fishery management plan and implementation 어업관리계획과 이행	Cleaner and safer fishery management from marine debris		
026	Food security and livelihood management	Fisheries Production 어업 생산량	Maintaining & Increasing trend		
027	Food security and livelihood management	Malnutrition rate 영양실조 비율	- No problem - Decreasing trend		
028	Food security and livelihood management	Poverty, education and employment 빈곤, 교육과 고용	- Hope New Deal Changwon' for citizen's wellbeing policy - Healthy and Welfare Call Center for poverty and employment - Budget allocation		
029	Food security and livelihood management	Livelihood programs 생계 프로그램	Compensation program for fish kills		
030	Pollution and waste management 오염과 폐기물 관리	Management plans 관리 계획	City management plan		
031	Pollution and waste management	Water quality 수질	Getting better		
032	Pollution and waste management	Air quality 대기질	Good and improving		
033	Pollution and waste management	Sanitation and domestic sewerage 하수설비 및 생활하수	Evaluation by MOE		
034	Pollution and waste management	Municipal solid waste 도시의 고형폐기물	- Citizen Evaluation in site - Campaign for collection, reduction, and recycling		
035	Pollution and waste management	Industrial, agricultural and hazardous waste 산업, 농업 폐기물 지정폐기물	- Green Industry council by 131 business sector - industrial waste recycling (76.6% in 2012, target plan : 85% in 2015, and 90% 2020)		

Executive Summary

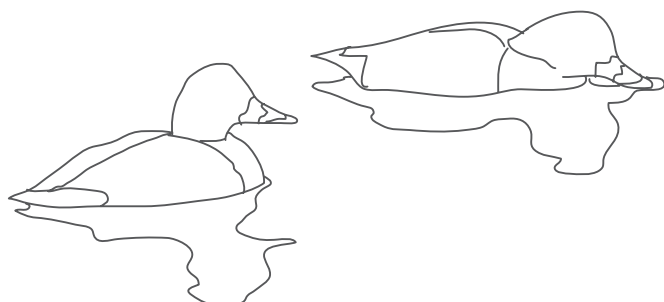


The integrated city of Changwon launched on July 1, 2010. Changwon, Masan, and Jinhae, the three cities which had shared the same sphere of living, were merged into “Changwon”, the first integrated city in Korea with a population of 1.08 million at that time. Changwon is now taking on the appearance of an international city to lead change of lifestyle in climate change era. Changwon has been making efforts to form an eco-transportation system as an action for low carbon emissions under its long-term program of becoming the world’s environmental capital by 2020. The city has set the usage rate of public bicycle rentals at 15% by 2015. The public transportation will also guarantee a healthy pattern of living and reduction of traffic accidents, and better the city with a safer environment. Changwon City and ICLEI are looking for 12 pioneer cities worldwide that are eager to take on the challenge of becoming cities of EcoMobility excellence.

Masan Bay in Changwon is a historical harbor from which high quality iron was transported to neighboring countries 2000 years ago and red tide break was firstly recorded about 600 years ago. A new and well structured harbor was opened in 1899. Samsung founder, Byungchul Lee (1910-1987) was born 100 years ago in Gyeongnam Province. Samsung’s history traces back to Masan in 1936, where he opened a rice mill and grain trade shop at the age of 26. He moved to Daegu to start a business at the edge of a marketplace trading dried fish and fruits naming it Samsung in 1938.

A variety of coast usage has caused damage to the fisheries and recreation. In the 1970’s large industrial complexes had been built in this area therefore increasing the level of pollutants in coastal waters. A large amount of sewage had been discharged through short streams into Masan Bay without proper treatment between 1970~80, which led to closure of recreational beaches and a prohibition of shellfish harvesting in 1979. The first large-scale red tide outbreak (1981) was observed in Masan Bay. A typical enclosed bay, Masan Bay is surrounded by land and islands. The reclamation of Masan Bay has caused sharp declines in the natural coastlines and shallows. Consequently, Masan Bay became the most polluted bay in Korea.

Masan Bay was designated as a Special Management Area. A large sewage treatment plant started its operation in Nov. 1993 with 280,000 m³/d of treatment capacity, and extended up to 500,000 m³/d and upgraded an advanced wastewater treatment process (A₂O process with filtration and UV disinfection) until 2007. Sediment dredging was applied to the bay as a decontamination process from 1990 to 1994. The amended Marine Pollution Prevention Act in 1999 has provided the legal framework for the watershed-based approach to be applied to marine environment



management in Korea. NGO alliance for Masan Bay restoration was launched in 2000 to start governance activity for the cooperation with GO. However, there should be political support and funds available to implement and enforce it in an integrated manner. The Korean government has been planning to introduce a total pollution load management (TPLM) system into the coastal environment management regime of the Masan Bay as the 1st model case in Korea. It is clear that a close collaboration of stakeholders in this effort is recovering and preserving the bay ecosystem. The governance of Community Advisory Council and Local Agenda 21 for Masan Bay are calling to actions for the better city life and response to climate change. The Community Advisory Council for Masan Bay started in 2005 as a legal organization for Masan Bay's ecosystem recovery and total pollution load management (TPLM) by the systematic approach of KMI assistance. Based on the newly formulated mechanisms, central government, local government, three Cities, Navy, Academies, business sectors and NGOs established a Community Advisory Council.

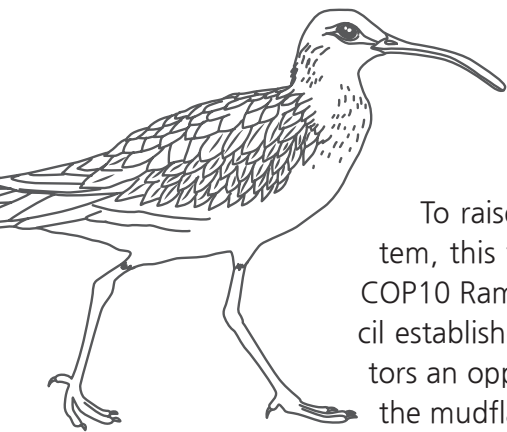
The drainage area of TPLM designated as a Special Management Area is 737 km². TPLM has been initiated since 2005 to monitor total pollution loads into Masan Bay and Bay carrying capacity, and allocated reduction load to each city (Masan City, Jinhae City, and Changwon City).

The Community Advisory Council for Masan Bay had 20 regular meetings from 2006 to 2012 and TFT meetings answering various issues such as aimed water quality, allocation of load reduction, coastal area reclamation, communication and education, public participation, involvement of citizen science monitoring, and so on. Major action plans of TPLM include the regulation of polluted runoff by formulation of natural streams and repair of sewer lines, increase of removal efficiency in waste water treatment plants, and control of coastal development in addition to bay clean up activity, TV broadcasting, drawing contests, and many other activities led by city governance.

Ecosystem restoration efforts were given to the Bongam tidal flat as well as Masan Bay.

The ecological restoration was also observed in the urban tidal flat and Masan Bay as habitats of otter, birds, fish, shellfish, and benthic organisms with recovery of tidal flat sediments. As the result of combined efforts, the urban(Bongam) tidal flat in Masan Bay was designated as one of the national protected wetland areas in Dec. 2011.

The urban (Bongam) tidal flat is located at the most inner estuary of Masan Bay and in the front of several factories at the entrance of the Changwon industrial complex zone which allows for good access to citizens. This tidal flat under reclamation pressure was neglected as a small piece of tidal flat considered to be useless. However, it was protected by the suggestion from NGO and acceptance from GO in 1999.



To raise the public awareness of the importance of the ecosystem, this tidal flat was assigned as an official visit site during the COP10 Ramsar Convention in 2008. The Community Advisory Council established as eco-tour program which provides citizens and visitors an opportunity to witness the restoration of the ecosystem and the mudflat ecosystem service. The sediments and bio-species have

been monitored from 1988 to the present. Citizen science monitoring has been carried out by the governance mechanism.

In 2012 the 2nd stage of TPLM was established with a new water quality target of COD and TP in the same integrated manner applying ecosystem management approach and expected to be analyzed with ecosystem health index. The final agreement was made in the 20th Community Advisory Council meeting. TPLM as a modified ICM includes ecosystem management, governance practices, implementation evaluation, and feed back mechanism. The analysis of SOC for Masan Bay was made by 35 indicators with status and trend. Indicators of local government development plan, protected areas for coastal habitats and heritage, and reclamation and conversion were evaluated as 'bad'. There was a local development plan established in 2003 before merging the three cities into one big city even though several development plans were reestimated and cancelled. As the Robot Land project was also launched along the coast, discussions and suggestion were made not to degrade the seagrass bed and carbon zero Robot Land as a good case of blue economy. Indicators of coastal strategy and action plan, sustainable financing mechanisms, level of preparedness for disasters, degree of vulnerability to disasters, and social and economic losses due to disasters were assessed as 'moderate' however, the trends are 'improving'. An urban center was developed along the bay, and reclamation is taking place as opposed to buffer zone formation in the era of rising sea levels. Thus vulnerability and economic loss due to disasters were expected though the frequency of disasters in the bay area is low.

The assessment of the other 25 indicators appears positive in a 'good' state with 'improving' trends. More importantly the benefits derived from the success of ecosystem management have been enjoyed by the people in the Bay. The SOC report helps us to tell what the strengths and the weaknesses of environmental management in Masan Bay are. The experience in Changwon shows the procedure as to how an urban tidal flat as well as Masan Bay have been recovered, how the stakeholders have been participated together, and what the services of recovered bay and coastal wetland are.

The State of the Coasts of Masan Bay was developed to assess the progress and impacts of ICM implementation in the Masan Bay in Changwon City. This report was prepared through the concerted efforts of stakeholders. The major findings and recommendations of the stakeholders in the Masan Bay are Introduced below.

Policies, Strategies, and Plans

Masan Bay was once notorious as one of the most polluted bays due to industrialization in 1970s and 1980s. The first action of the government to improve the situation was the designation of the Bay as one of the Special Management Areas (SMA), under the Marine Pollution Prevention Law (1977). The SMA has enabled the concerned government agencies to implement projects, to mitigate pollution, to rehabilitate already polluted areas, and to take preventive and remedial actions.

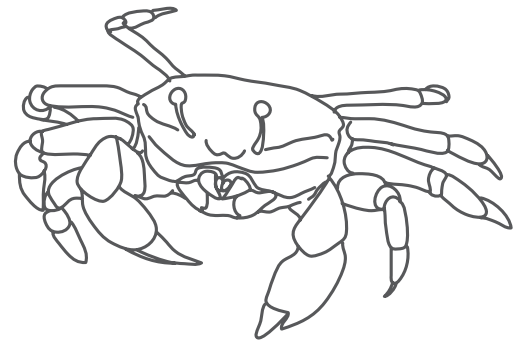
Recently, the Total Pollutant Load Management System (TPLMS) was launched for Masan Bay in 2007, targeting a level of water quality that is suitable for swimming and fishing by 2020. The TPLMS has become a basis for the Integrated Coastal Management in Masan Bay. The opportunity of communication between GO and NGO should be provided at the beginning of local development plans.

Institutional Arrangements

During the course of preparing for the TPLMS in Masan Bay, the Community Advisory Council for Masan Bay was established in 2004. The Council is composed of the stakeholders: MLTM (Ministry of Land, Transportation and Maritime Affairs), ME (Ministry of Environment), Navy, Gyeongnam Province, Changwon City, Changwon Chamber of Commerce and Industry, Changwon Office of Korea Federation for Environmental Movement, Kyungnam University, and many other stakeholders. The key roles of Council are to approve reduction scheme and targets, build local capacity in system and plan implementation, and increase public awareness on TPLMS.

Legislation and Enforcement of Laws

Policies for TPLMS, which is closely related to ICM was adopted by the Changwon municipal government in 2007, following the TPLMS plan for Masan Bay established by MLTM and Gyeongnam Provincial Government and Changwon city And this TPLMS plan became the base for the ICM activities.



Information and Public Awareness

As one of core activities, the Community Advisory Council for Masan Bay has set out public awareness programme, which include: TPLMS education programme, citizen's monitoring, publications, international collaboration including NOAA and NGO support, among others. These activities were proven successful in providing information relating to the environmental protection and restoration and implementing the TPLMS. The recognition of governance during CAC meetings and activities of TPLMS as ICM mechanism should be increased among stakeholders for active participation.

Capacity Development

Various programs have been conducted for the capacity development in Masan Bay area by the government agencies and nongovernment groups. Among the programs, the graduate course of ICM in Kyungnam University was excellent. This was the only ICM course in South Korea. More than 20 students graduated from this Master's course from 2001 to 2011. The education programs of CAC need to be strengthened because the capacity building of NGO group members and government officials is the most important in ICM.

Financing Mechanisms

The Korean government has been spending about 150~200 billion Won (150~200 million USD) every year for Ocean and Coastal Environment. Budget for ICM is included in this. Changwon municipal government has been spending about 4 billion Won (4 million USD) every year for the Environmental Management and Education. Financial mechanism would be more consolidated for continuing collaboration by the support of local governments such as Changwon city and Gyeongnam province.

Natural and Man-made Hazard Prevention and Management

The Changwon Municipal government is making various efforts for the prevention and management of natural and man-made hazards. Especially, Coastal Inundation maps were made. The Coastal Inundation Maps were designed to predict potential flooding regions and the depth of flooding by considering flooding marks hit by typhoon, heavy rainfall and surge. The map is subdivided into Flood Inundation Risk Map and Coastal Inundation prediction Map which indicates potential flooding areas, an extent of damages, predicted depth of flooding by predicting potential damages from typhoons, heavy rainfall, and surges on the coastal areas.

Habitat Protection, Restoration and Management

There has been some problems in protection and management of the habitat, with some hopeful signs. While some parts of habitat were lost due to the reclamation project in the Bay for development of land for industry, some part of the Bay, such as Bongam Tidal Flat was designated as a Protected Wetland Area as well. And this Protected Wetland Area is visited by many students and citizens, contributing to public awareness program. The coastal pollution of Masan Bay has been well controlled in a total pollution load management for the first time in Korea, leading to the recovery of fish and shellfish and a variety of species of birds coming back. This kind of restored area as a place where citizens enjoy fishing and recreation should be extended along the coast of Masan Bay.

Water Use and Supply Management

As the water supply facilities are very well equipped throughout the nation, and as Changwon city is so close to the water from Nakdong River, there has been not much interest in water supply in Changwon City. But, as a kind of campaign to save water, rain water use has been recommended by many NGOs recently. Therefore, a local law on rain water use was made by the Changwon municipal congress in 2010, encouraging rain water use in this city.

Food Security and Livelihood Management

The fisheries production in Changwon city has been steadily increasing for the last decade. As the over-fishing is the worldwide concern, the Changwon city has been trying to control the over-fishing. Changwon city is one of the best cities in terms of poverty reduction and education in Korea. There has been lots of policy measures for the social welfare, such as “Hope New Deal Changwon” Program.

Pollution and Waste Management

The Total Pollutant Load Management System (TPLMS) was launched for Masan Bay in 2007. Water quality in Masan Bay has been improved since then. And, to improve the air quality in Changwon City, lots of efforts were made. Now, there are 185 natural gas vehicles among the 254 municipal buses. And, the public bicycle system with about 4 thousand public bicycles in Changwon city is famous as the best in Korea.

Introduction to Masan Bay and Changwon City

History of Changwon



Figure 1. Location of Changwon

Changwon, which boasts 2000 years of history, used to be a trading center of Northeast Asia, manufacturing iron and exporting it to China and Japan during the Proto-Three Kingdoms Period of Korea.

At present, Changwon is recreating itself as a world masterpiece city and one of the most competitive cities in Korea based on Changwon City's history, culture, industry and coastal resources.

10th Century B.C.

Changwon during the Prehistoric age

It is not clear when people started living in Changwon, but according to the artifacts and data uncovered so far, it has been estimated that people started living in Changwon during the Neolithic Age. The Bronze Age began in Korea around the 10th century B.C. and people probably started living in Changwon from that time. The majority of the pattern-less earthenware objects excavated from the lowest layer of the Sungsanpaechong Shellmound seems to have been made during the later period of the Bronze Age. The tradition of pattern-less earthenware was transmitted to the makers of Gimhae earthenware, which appeared during the Proto-Three Kingdoms Period of Korea.

Year 1400

Changwon during the Joseon Dynasty

The name Changwon first appeared in July in the 8th year of the reign of King Taejong of the Joseon Dynasty when two prefectures, namely Uichang and Hoewon, were combined to create a higher division, Changwon-bu. In the 15th year of King Taejong's reign, Changwon-bu was ascended to become Changwondo. In the 1601, it was ascended to become Changwondae-do. Ungcheon-hyun Prefecture in the Jinhae Region was ascended to become Ungcheon-do. In the 5th year of King Jungjong's reign (1510) but became Ungcheon-hyun Prefecture again in 1512.

In the 1800s

Changwon during the Great Han Empire

With the implementation of a system comprising 23 divisions during the 32nd year of King Gojong's reign (1895), Changwon was reorganized as Changwon-gun and Ungcheon-gun. In 1903 the 7th year of King Gwangmu's reign when the Renaming Act 48 was implemented, Changwon was renamed as Changwon-bu. In 1908 the 2nd year of King Yunghee's reign, Ungcheon-gun and Jinhae-gun were integrated. During the Japanese colonial period, Changwon-bu was changed to Masan-bu in 1910, Masan Port was opened and Changwon-gun was separated from Masan-bu.

In the 1970s

Changwon during the modern period

After Korea's liberation from Japan, Masan-bu was renamed as Masan-si and Jinhae-eup of Changwon-gun was ascended to become Jinhae-si in 1955. After Changwon District was ascended to become Changwon-si in 1980 the three cities developed into independent administrative bodies. Notably since the establishment of the Masan Export Free Zone in 1970 and the development of the Changwon National Industrial Complex in 1974 the cities have grown together as an economic center of Korea.

In the 2010s

Launch of the integrated Changwon city

Since ancient times, Changwon, Masan, and Jinhae have grown as central cities of industry, culture and administration in Yeongnam Province. Finally on July 1, 2010, the three cities united to create Unified Changwon City-Korea's first Autonomous Integrated Administration Area and rapidly became one of Korea's most competitive cities. With the construction of a regional specialized growth belt, Unified Changwon City is being recreated as a world masterpiece city by strengthening its industrial foundations to the world-class level and by strengthening the education, culture and welfare of the city and its citizens.

History of Masan Bay

Masan Bay is located on the south east coast of the Korean peninsula, acting as a gateway to other countries like Japan, Russia, and China. The location has provided the city with rich opportunities to be a center of trade as a port city. Also, the city has been involved in various conflicts between these countries. In 15th century, Masan has become famous for its trade capacity among other cities of RO Korea due to its strategic location as the collecting center of agricultural and fisheries products.

Opened in 1899, Masan has become the battle ground of advanced countries. These advanced countries set up modern estab-

lishments such as administration buildings, modern schools, post offices, banks and private companies. Consequently the city has been rapidly modernized since the early 20th century.

Endowed with scenic beauty, Masan became the home of many artists and poets such as the great poet, Lee Eun Sang, a composer of the famous poem “Gagopa” and a great sculptor, Moon Shin. As a city surrounded by a bay, Masan has been famous for its clean and beautiful sea which often provides artistic motives to writers and poets.

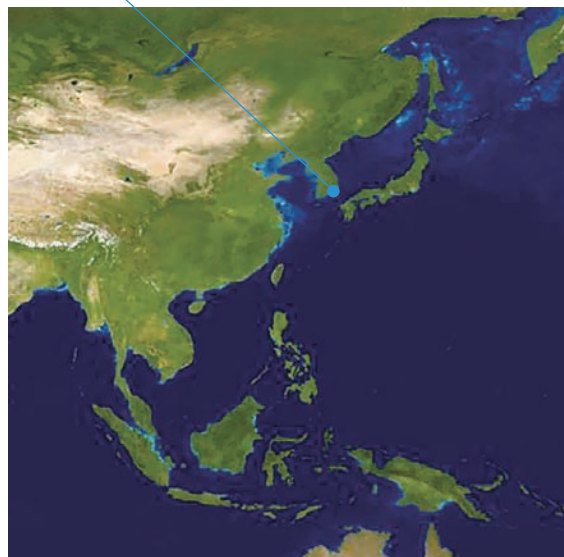


Figure 2. Location of Masan Bay

Water quality deterioration

With the rapid industrial development of the bay area, Masan Bay has become the home of several industrial complexes. The Masan Free Trade complex was set up in 1970 and the Changwon Machinery complex was developed in 1974. Thus, pollution loads increased considerably. However, pro industry-priority policy of the government caused the discharge of high levels of polluted wastewater directly into the sea. The environment of Masan Bay has quickly deteriorated. Consequently, beaches were closed and shell fish harvesting was banned. Harmful Algal Bloom (HAB) has become a chronic event in the Bay.

According to the National Water Quality Assessment, mean value of COD from 1997 to 2006 in Masan Bay is 2.4 mg/L, which is two times more than national averages the national average (1.15mg/L). This quality is a Level III, not suitable for fisheries or recreational activities but suitable for industrial use. In 1994, COD level reached to 5.8 ppm. Also, HAB event occurrence in Masan Bay covers 15% of national occurrence, demonstrating the frequent occurrence.

Ecosystem Recovery in Masan Bay

Total pollution load management (TPLM) system as one of ICM has been introduced into the coastal environment management regime of the Masan Bay as the 1st model case in Korea. It is clear that a close collaboration of stakeholders in this effort is recovering and preserving the bay ecosystem. The Community Advisory Council for Masan Bay has started since 2005 as a legal organization for Masan Bay's ecosystem recovery and total pollution load management (TPLM). Ecosystem restoration efforts were given to the Bongam tidal flat as well as Masan Bay. The contamination level of sediments in the tidal flat was changed from heavily polluted to non-polluted level by the comparison of data between 2005 and 2009. The loadings of COD and T-P coming to the tidal flat of Bay mouth through three streams was gradually reduced from 2,692 kg/d in 2005 to 646 kg/d in 2010 because of sewer line repairs, expansion of wastewater treatment facilities, eco-stream, clean-up activities as well as public awareness increase.

Bongam tidal flat as an Eco-education center forms a natural ecological system which can be hardly seen nearby the industrial complex. Moreover, this is home for all kinds of salt marsh plants and about 50 kinds of migratory birds, crabs, otters, and benthos. As the result of combined efforts, the urban (Bongam) tidal flat in Masan Bay was designated as one of national wetlands protected area.

Key Facts about Changwon

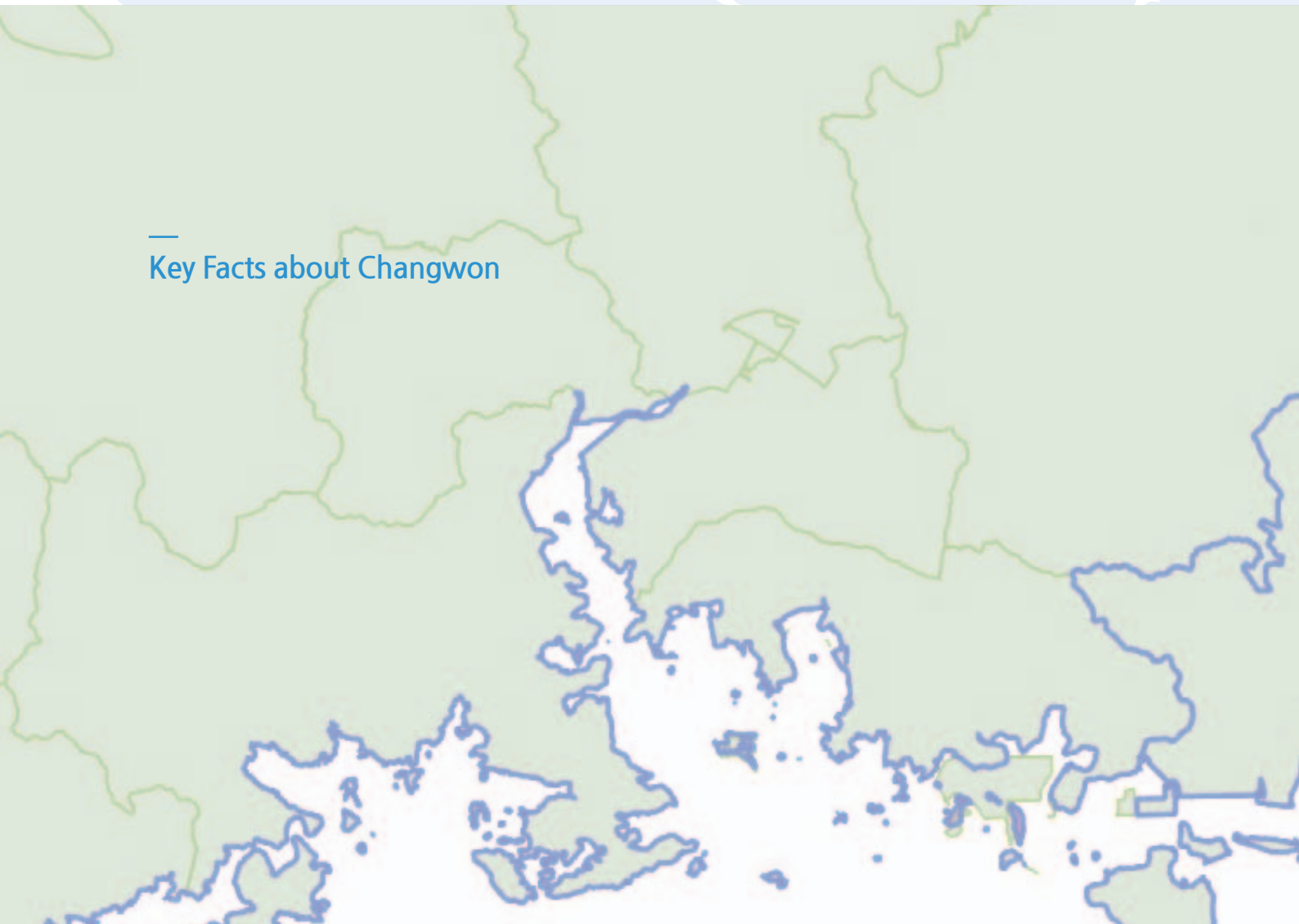


Figure 3. Coastline and Islands in Changwon

1. Coastline and Islands

Table 1. Coastline and Islands

Coastline(km)	321.14
Islands/Area(km ²)	8 / 2.036
Inhabited Islands Population	1064
Uninhabited Islands/Area(km ²)	35 / 1.982

Table 2. Information of Coastline and Islands

Unit : km, km², number, household, person

Year & Gu	Coastline(km)			Islands						
		Mainland	Island	No. of islands			Area Inhabited (km ²)	Area Uninhabited (km ²)	Households	Population
					Inhabited	Uninhabited				
2010	321.14	264.02	57.12	43	8	35	2,036	1,982	414	1064

2. Population Trend

Table 3. Population trend of Changwon city

No. of households	Population									Population increase rate (%)
	Total			Korean			Foreigner			
	Male	Female		Male	Female		Male	Female		
400,054	1,103,849	563,303	540,546	1,090,181	553,938	536,243	13,668	9,365	4,303	100.67

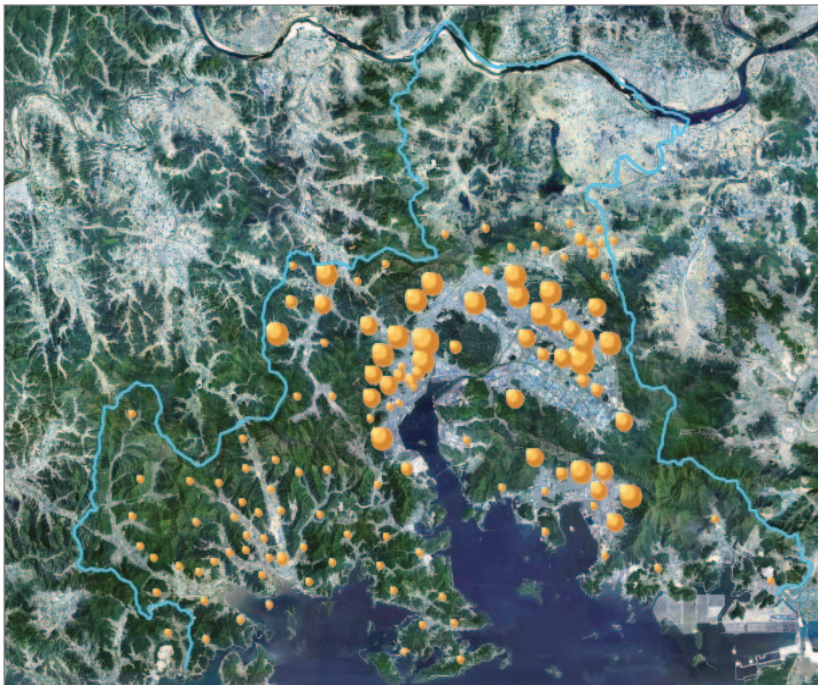


Figure 4. Spatial Distribution of Population in Changwon

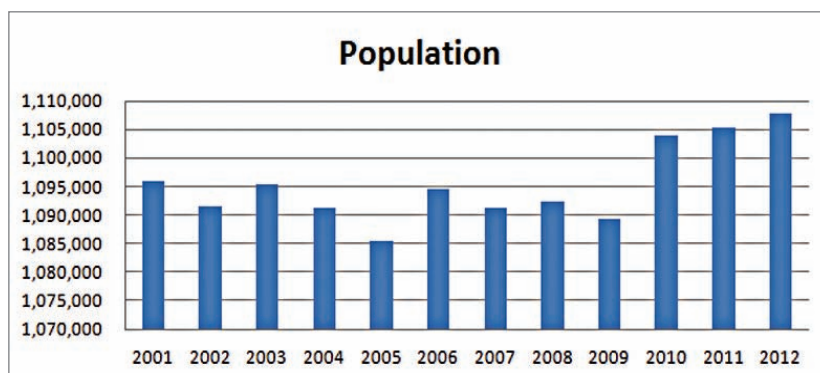




Figure 5. Population Trend in Changwon(2001-2012)

Source: http://stat.changwon.go.kr/jsp/sub03/03_04.jsp

Registered number of people in Changwon city is 1,107,955 as of end of June, 2012. The population at July 2010, when the three cities were merged into Changwon City, was 1,081,808. So, it means the population increased by 26,147 people for the last two years.

Indicators

SOC Code	Category	Indicator	State	Trend
001	Policy, strategies and plans 정책 및 전략 계획 수립	Coastal profile and environmental risk assessment 연안해역 정보/ 해역환경영향 및 위해성 평가		

Description	This indicator measures the percentage of coastline that has undergone environmental risk assessment, coastal profiling or similar scientifically-based evaluation in order to identify priority issues/threats to sustainable development of coastal and marine resources.
Rationale	Effective coastal management relies on planning that takes into account strategic and scientific assessment of the area, including social, cultural, political, economic, environmental, and policy issues, and the identification of priority concerns for coastal managers and policy makers. This strategic assessment should be the basis for developing strategies and action plans for coastal management.
Data requirements	<ul style="list-style-type: none"> • Total length of coastline • Coastal environmental profile/environmental risk assessment/other similar assessments • Length of coastline covered by environmental assessment
Guide Questions	<ol style="list-style-type: none"> 1. What is the total length of coastline of the area? 2. Has coastal environmental profiling / environmental risk assessment / other similar assessments been conducted? Specify name and year of assessments, responsible organization, scope and geographic coverage of the assessment. OR 3. Has a document containing relevant site information (physiographic, biological, demographic, socioeconomic, institutional, pollution sources, etc.) been prepared and made available to stakeholders? Who conducted the baseline data gathering and what information were gathered?

Results

- The total length of coastline of Changwon is approximately 321.14 km
- Marine Ecosystem Health Index to be applied as well as regular environmental assesment.
- Environmental assessment has been carried out for coastal sea of Masan Bay, all the streams flowing into Masan Bay, and effluents from two wastewater treatment plants by National Fisheries Research and Development Institute and local universities (Kyungnam University and Changwon National University).
- Recently Marine Ecosystem Health Index (MEHI) was developed for the purpose of assessing coastal health and practical service of ecosystem evaluation based on the holistic approach of data set by Korea Institute of Ocean Science & Technology.

- Results and Recommendation



Figure 6. Location of Masan Bay.



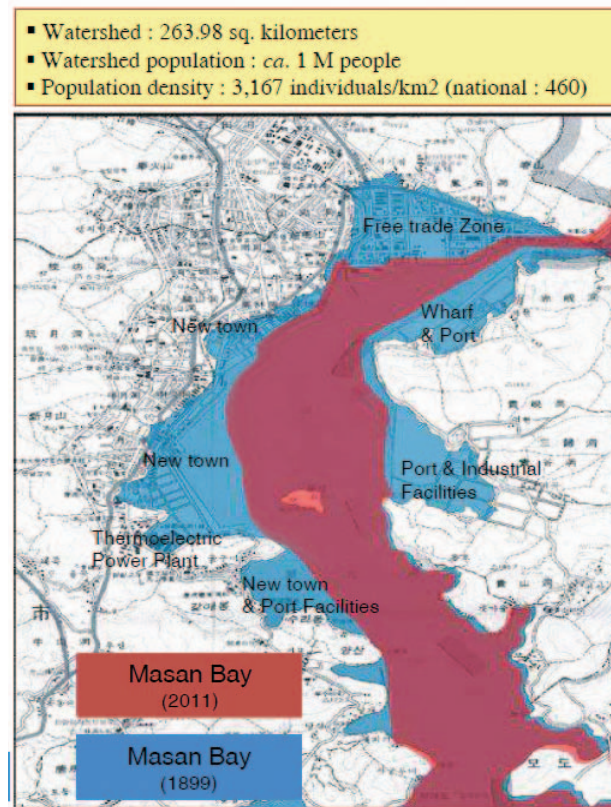


Figure 7. Reclamation projects around Masan Bay area.

To secure lands for industrial complexes, the government set out large scale reclamation projects around Masan Bay area in 1960s. At that time, there were no environmental impact assessment policies or regulations. Thus, these developments and reclamations were conducted without considering environmental capacity of the Bay, which negatively affect the water quality significantly. Accordingly, the sea area in the Masan Bay was reduced from 19.5 Km² in 1964 to 14.3 km² in 2011.

Masan Bay has been identified as a coastal area that is becoming one of the most polluted estuaries in Korea. During the last 40 years, the natural features of the bay have been dramatically modified by urban, industrial, and port developments, with its tidal wetlands having been reclaimed to accommodate the expansion of a large population and ever-growing industry. As a result, the bay system became quickly and heavily polluted by a variety of wastes, including untreated municipal sewage and industrial wastewater, which led to harmful algal blooms, sharp oxygen depletion, loss

of aquatic life, and aesthetic problems. In addition, due to significant hygiene issue, Gapo Beach (situated near site R3, Fig. 5) was permanently closed in 1975. This was followed by shellfish harvesting being prohibited from 1979 onwards. Since the 1980s, there has been public and regulatory concern about these pollution problems. For example, the central government has been working intensively towards reducing land based pollution. A wastewater treatment plant (WWTP) was constructed in 1993 with a capacity of 280,000 ton/day(MLTM, 2008). In addition, there was also intensive

dredging activity in the bay between 1990 and 1994 to remove polluted sediments, with a total investment of 36 million USD. However, these preliminary effort were not enough to improve the quality of the water in Masan Bay. More recently, a total pollutant load management system(TPLMS) was launched for Masan Bay in 2007, targeting a level of water quality that is suitable for 'swimming and fishing' by 2020 (MLTM, 2008). The TPLMS project comprises a total of 800 km of combined sewer networks that convey sewage to two central WWTPs that have been upgraded with an

advanced biological treatment facility and an extended capacity of 500,000 ton/day, over 200 million USD has been invested into the TPLMS, with 30% of funding being provided by the private sector. The main purpose of the TPLMS was divided into two stages: (1) the reduction of organic matter (targeting chemical oxygen demand-COD-loads) from point sources in the watershed during 2007-2011 and (2) the reduction of nitrogen and phosphorus related nutrients in the bay through regulating non-point sources across the watershed during 2012-2016.

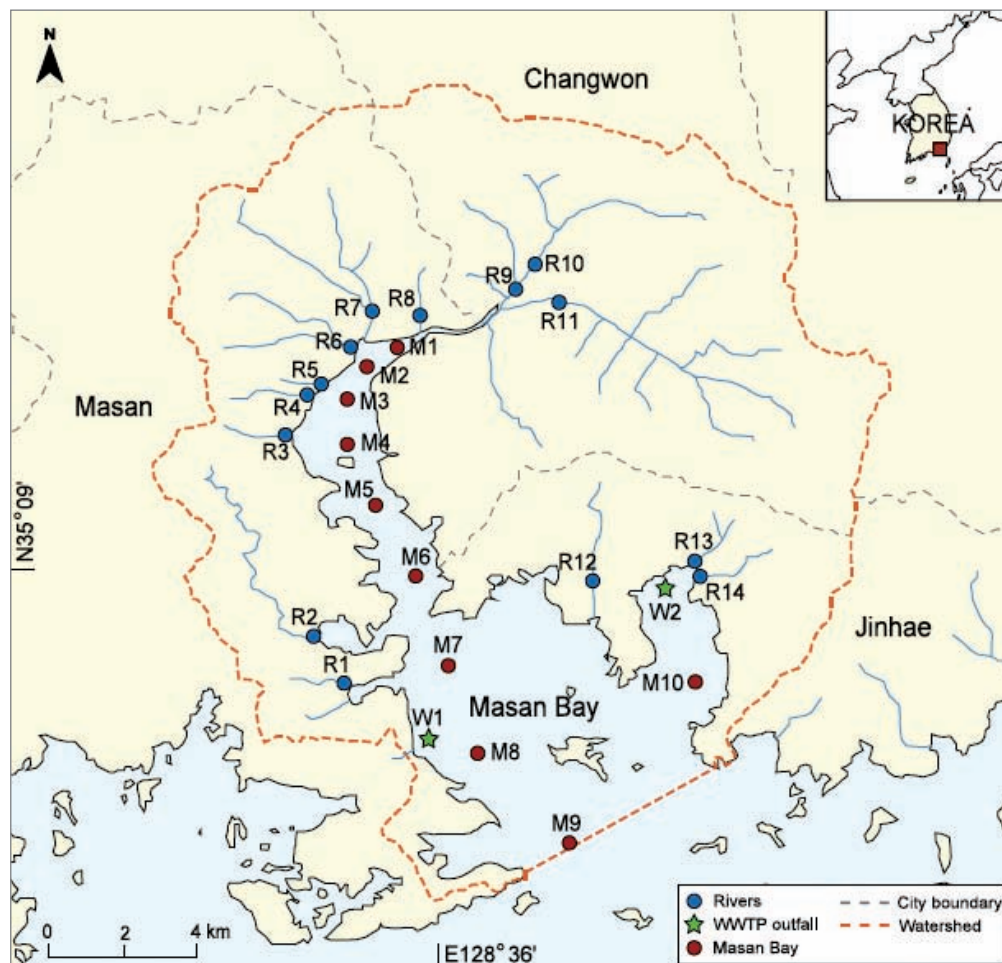




Figure 8. Geographical Features of Masan Bay.

Based on the TPLMS(Total Pollutant Load Management System), water quality at 14 streams and a wastewater treatment facility, and 10 sites in the sea have been monitored every month.



SOC Code	Category	Indicator	State	Trend
002	Policy, Strategies and Plans	Coastal strategy and action plans 해양환경 보전 실행 계획 수립		
Description	<p>This indicator measures the scope, coverage and objectives of coastal management, as delineated in coastal strategies and action plans. The indicator further looks into the specific roles and responsibilities for different stakeholders, proposed interventions to address existing or potential threats to sustainable development, including economic, biophysical and social aspects with specified targets and time frames. Finally, the indicator determines the government's commitment to implement the coastal strategy or action plan through its adoption at the provincial/city/municipal level.</p>			
Rationale	<p>A coastal strategy is a critical component of ICM, providing a framework for integrated planning and management. It not only serves as a platform for policy reform that promotes good governance, but facilitates interagency consultation, multisector cooperation and stakeholder participation. A coastal strategy identifies conflicts arising from multiple use of limited marine and coastal resources, establishes approaches and actions for protecting or enhancing environmental quality and biodiversity, while facilitating environment-friendly economic development and environmental investment opportunities. The strategy will not be useful if it is not adopted and translated into on-the-ground actions. Action plans define: a) the steps that are required in order to execute the strategies; b) the milestones or indicators that can be used to measure progress and changes; c) the time frame for the actions; d) the roles of the various stakeholders; and e) the measures for monitoring the implementation of the strategy.</p>			
Guide Questions	<ol style="list-style-type: none"> 1. Has a coastal strategy or coastal management plan, and action plans been developed through appropriate stakeholder consultation? Specify name, year, scope and geographic coverage of the Plan. 2. Has the Plan been adopted by the local government? Briefly describe the adoption of the Plan (e.g., through legislation or ordinance). 3. Is there a mechanism for monitoring and evaluation (M&E) of the Plan? How is the progress in implementing the Plan monitored? Briefly describe process of M&E (e.g., frequency, used as basis for updating and refining Plan) 			



Data requirements	<ul style="list-style-type: none"> • Coastal strategy and action plans • Management boundary (geographic) of the Plan • Operational management plans • Multi sectoral participation mechanisms • Local government commitments to implementation • Monitoring and evaluation program
Results	<p>The citizens around the Masan Bay were much concerned about their coastal environment and wished to return the bay back to the state once famous for its beautiful scenery. In this request, the Ministry of Land, Transport and Maritime Affairs (previously Ministry of Maritime Affairs and Fisheries¹⁾ of RO Korea as the responsible agency for marine environment started to take action in 1982 to manage the deteriorating trend of the environmental quality of Masan-Jinhae Bay, together with the Ministry of Environment.</p> <p>The first action of the government was designation of the Bay as one of the Special Management Area (SMA), under the Marine Pollution Prevention Law Act(1977). The SMA has enabled the concerned government agencies to implement projects, to mitigate pollution, to rehabilitate already polluted areas, and to take preventive and remedial actions. Several projects such as environmental infrastructure including wastewater treatment plants and sewer lines have been installed and large scale dredging project have been implemented.</p> <p>Implementation of the Masan Bay environmental projects was successful in slowing down the deteriorating trend of the pollution in the Bay area, but not in reversing the trend because the pollution loads to the Bay are simply more than the environmental carrying capacity. Studies revealed that the current concentration-based environmental discharge regulation is not effective in Masan Bay.</p> <p>In 2004, through the consultation with NGOs and experts of the Bay area, the government was able to receive an agreement from the stakeholders of the Bay to formulate the Comprehensive Management Plan for Masan SMA which includes the introduction of the TPLMS in the Bay. The Plan envisioned restoring the water quality of Masan Bay to Level II (COD range of 1 - 2 mg/L) through the implementation of the rigorous and science-based management tool, the TPLMS.</p>

• Results and Recommendation

What is TPLMS(Total Pollution Loads Management System)?

- The Korean TPLMS(Total Pollution Loads Management System) is an institutional mechanism to control the amount of pollution load within environmental carrying capacity to meet water quality target.
- The TPLMS regulates made up of the sum of all the point source loads “(wasteload allocation”) and load associated with nonpoint sources and background sources “(load allocation”) especially in summer.

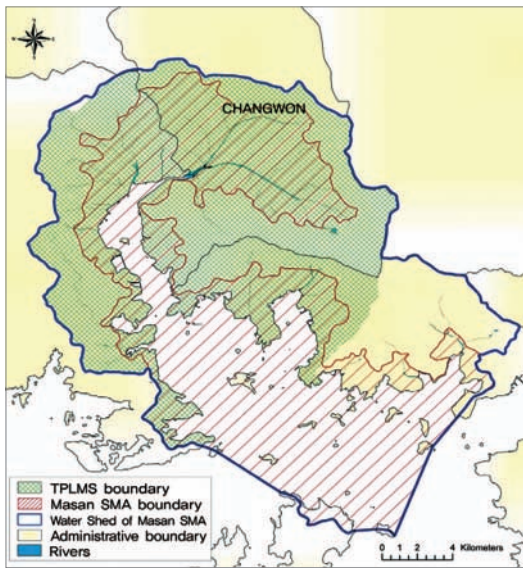


Figure 9. Masan Bay Management Boundaries.

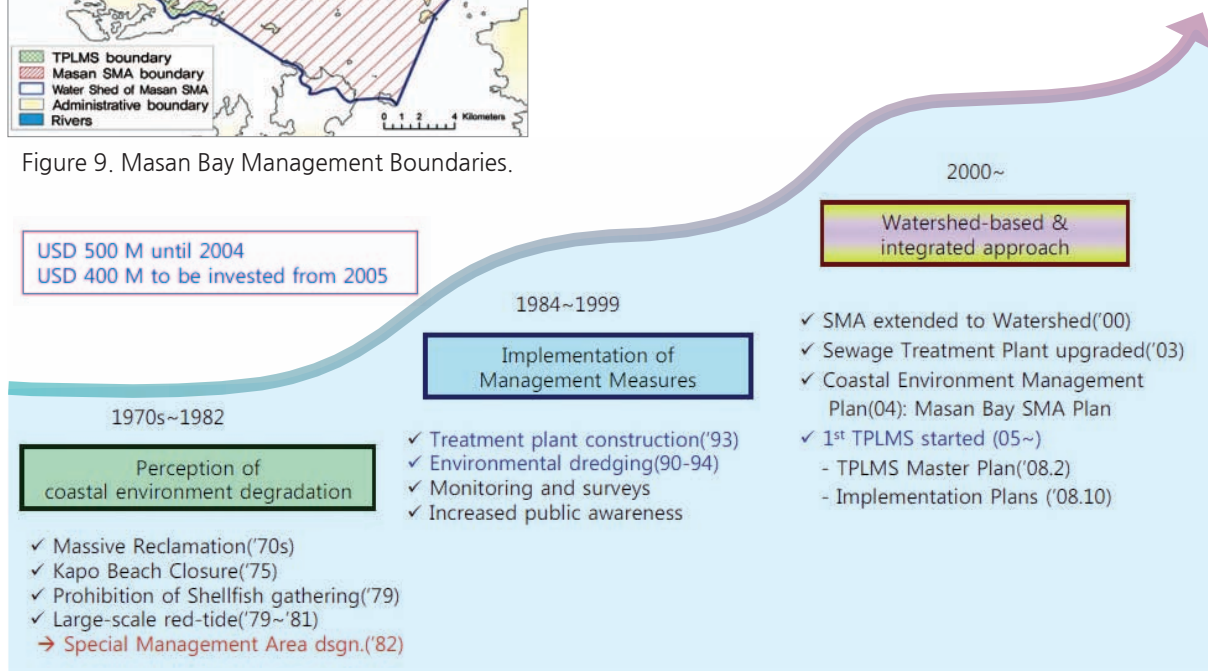




Figure 10. Dynamic Evolution of Environment Management For Masan Bay.

Table 4. Environmental issues in Masanbay

The public did not realize the problems of the Masan Bay until late 70s		
1970s To 1982	Perception of Environment Degradation	<ul style="list-style-type: none"> • Massive Reclamation ('70s) • Kapo Beach Closure ('75) • Prohibition of Shellfish Gathering('79) • Large-scale Red-tide('79~'81) → Special Management Area designation('82)
1984 To 1999	Implementation of Management	<ul style="list-style-type: none"> • Treatment Plant Construction('93) • Environmental Dredging('90~'94) • Environment Monitoring and Surveys • Increased Public Awareness
2000 to Now	Wastershedbased & Integrated approach	<ul style="list-style-type: none"> • SMA extended to Watershed('00) • Sewage Treatment Plan Upgraded('03) • Coastal Environmental Management Plan('04) : Masan Special Management Area plan • TPLMS introduced('05)

SOC Code	Category	Indicator	State	Trend
003	Policy, Strategies and Plans	Local government development planning, including coastal and marine areas 지방정부 계발 계획 수립(연안지역 포함)		

Description	This indicator reviews the local government units that have integrated coastal management issues and sustainable development of coastal and marine resources into their multi-year development plans.
Rationale	To determine an understanding of their commitment to coastal management, the development plans of local government units can be evaluated to ascertain whether the sustainable use of coasts and near coastal sea areas and the associated resources have been recognized for their value and the role they play in the development process. The integration of ICM into the development plans of local government units reflects a local commitment to ensure the protection and development of coastal and marine areas in the broader context of the coastal development strategy, through a more integrated economic, social and environmental policy and planning approach.
Guide Questions	<ol style="list-style-type: none"> 1. Do development plans of the local government integrate coastal and marine management? Specify programs for marine and coastal management identified in the local development plans. 2. Has the coastal strategy or coastal management action plans been integrated into local development/ investment plans? OR 3. Are local development/investment plans aligned with the coastal strategy and action plans?
Data requirements	<ul style="list-style-type: none"> • Local Development Plans
Results	The first phase of total pollutant load management system (TPLMS) was implemented in the Masan Bay Special Management Area draw on the successful factors contributed to facilitate the conflicts and the constraints particularly experienced in the load allocation of the TPLMS planning process. Analyses showed that establishment of an affordable water quality target was the most critical because it enabled local governments to allocate the loads which could support for reasonable developments as well as to relieve their load reduction burden. As a local coordinating and facilitating framework, the Masan Bay Advisory Committee and Masan Bay Technical Advisory Task Force also played a significant role in making an agreement on the water quality target and to facilitate the conflicts in the load allocation process.



Results	<p>However, it appeared that some technical and institutional constraints should be properly addressed to prepare the second-phase TPLMS. The constraints may include the uncertainties which are involved in developing a water quality target, and the hardly applicable load-allocation system to the individual discharge facilities which is not supported by the national effluent permit system. Some improvement strategies and measures such as an establishment of load-based relative management target instead of the quantitative water quality target and introduction of permit-based load allocation system were suggested to overcome the constraints.</p>
	<p>Local government development plan was reviewed and changed as shown in Fig. 12</p> <p>There are a few on-going local government developing plans such as New Harbor project in Masan Bay, and Robot Land project which established about 10 years ago and caused lots of debate in bay area indicating frowning face but improving trend by the consultation of various stakeholders.</p>

• Results and Recommendation

- ❖ TPLMS Target : COD 2.5mg/L, Summer Median
- ❖ Allocation of Load Control

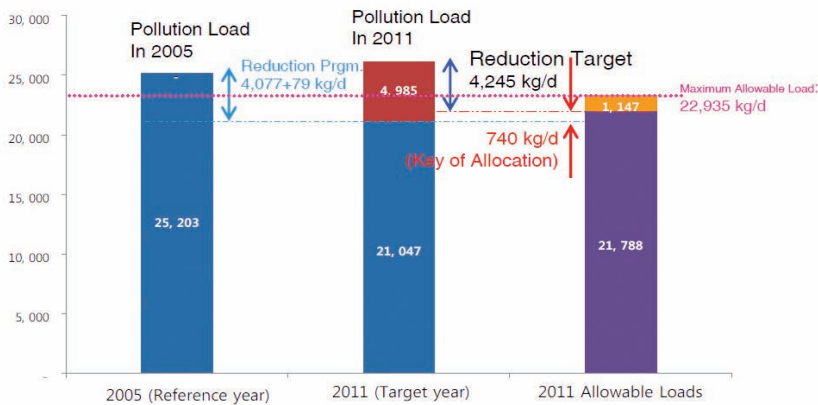


Figure 11. Summary of TPLMS(total pollutant load management system) For Masan Bay.

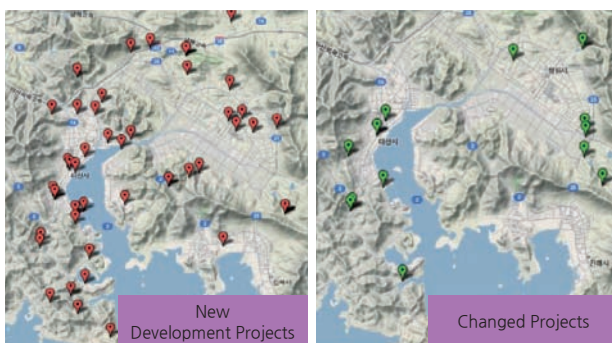




Figure 12. Changed development projects were reviewed by public after establishment of 1st Masan Bay TPLMS in 2008.

SOC Code	Category	Indicator	State	Trend
004	Institutional arrangements	Coordinating mechanism 협력 메카니즘		
Description	This indicator considers the presence of a functional inter-agency and multisectoral coordinating mechanism that oversees the development and implementation of the ICM program. The indicator further looks into the institutionalization of a local office with adequate administrative resources - staff, budget and equipment, to oversee, guide and coordinate the implementation of coastal strategies and action plans.			
Rationale	A fully functional coordinating body consisting of the government agencies, nongovernment entities, private sector, civil society and other stakeholders, as appropriate, is a key component of ICM programs. The purpose of the coordinating mechanism is to harmonize any overlapping responsibilities of line agencies and stakeholder interests, as well as to integrate policy and management interventions. Moreover, the availability and allocation of adequate administrative resources for ICM is an expression of the capacity of the ICM management team to administer, coordinate and implement activities over time. In the implementation of ICM, there is a need for a local office to serve as a clearing house, central coordinating agency and focal point for multi sectoral activities.			
Data requirements	<ul style="list-style-type: none"> • Coordinating mechanism established and legal basis • Organizational structure of the coordinating mechanism • Coordinating office established and legal basis • Organizational structure of the coordinating office • Staff and budget allocation of the coordinating office 			
Guide Questions	<p>Briefly describe the following items.</p> <ol style="list-style-type: none"> 1. Is there a mechanism for interagency and multisectoral coordination and harmonization that addresses coastal management issues? Is this mechanism institutionalized through legislation and with regular budgetary allocation to sustain its operation? 2. Does the body regularly meet and discuss implementation of coastal management plans? How frequently? Are records/proceedings of the meetings prepared and disseminated? 3. Has an office been established locally, which serves as a clearing-house, central coordinating agency and focal point for multisectoral activities related to ICM development and implementation? How many staff are assigned to the office and what is its budgetary allocation for ICM development and implementation? 			



Results	<ol style="list-style-type: none"> 1. Yes, there is a mechanism well institutionalized through legislation and with regular budget 2. Community Advisory Council(CAC) had 22 regular meetings during 2005~2012. All the records were prepared and disseminated for every meeting. 3. Yes, CAC office has been locally established since 2008 with 0.1 million budget every year. <p>2004, Establishment of Management Plan</p> <ul style="list-style-type: none"> - Integrated Monitoring, TPLMS, Dredging, Ecosystem Restoration 2005, Establishment of Management Guideline for TPLMS - Role of Central and Local Government on implementing TPLMS <p>2007, 1st TPLMS Plan (draft)</p> <ul style="list-style-type: none"> - Two meeting with Min. of Environ.(Budget) - Pollution Load Allocation & (New) Reduction Programs (Local Gov. and Cities) - Adapting and Verifying the draft <p>2008, Establishment of 1st TPLMS Plan(8.2)</p> <ul style="list-style-type: none"> - Establishment of 1st TPLMS Action Plan(8.10) <p>2011, improving water quality of Masan bay to the average level Level 2, COD 2ppm or lower</p>
---------	--

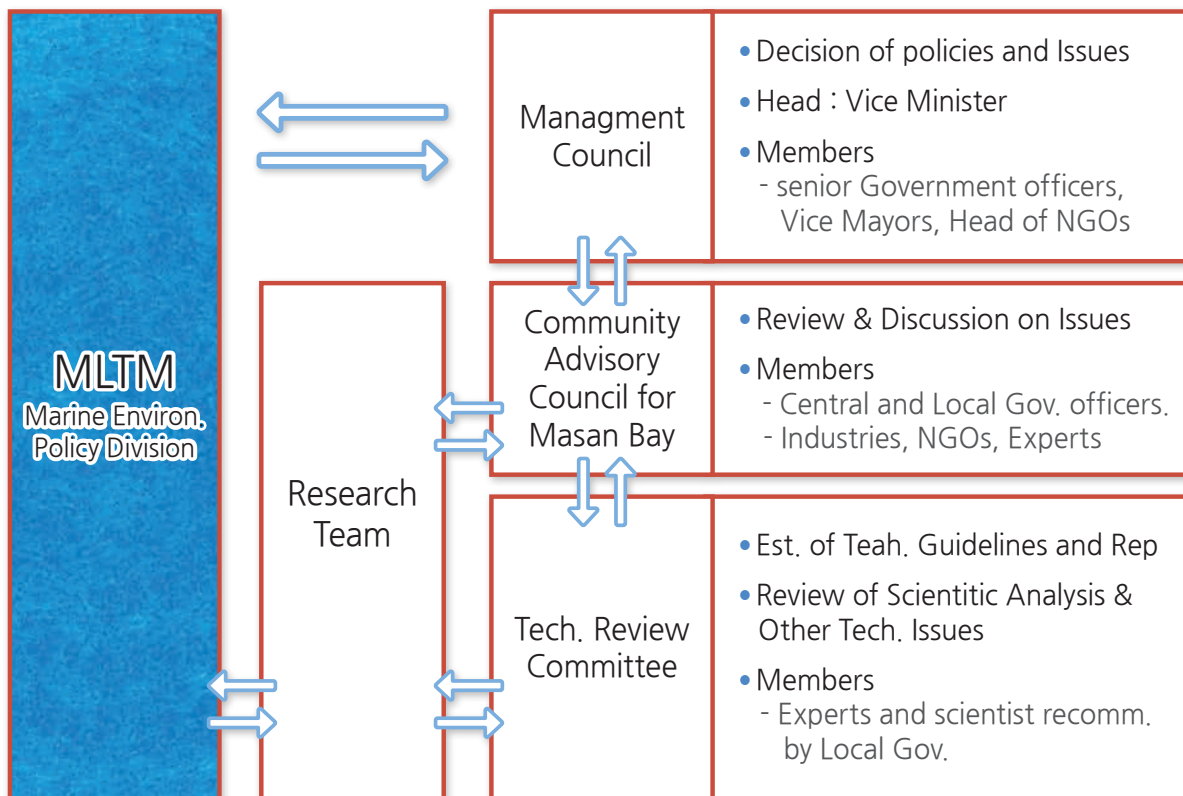




Figure 13. TPLMS Frame work For Masan Bay.

SOC Code	Category	Indicator	State	Trend
005	Institutional arrangements	Participation of stakeholders in the coordinating mechanism 이해당사자의 참여		
Description	<p>This indicator reports the pertinent sectors (government, nongovernment, private, civil society, academe) that are represented in the coordinating mechanism for the ICM program and are part of an integrated decision-making process. It further reflects the commitment of government agencies and other stakeholders to implement, comply with and enforce ICM plans and activities. It also suggests the reality of the execution and performance of ICM initiatives, as well as the degree of acceptance on the part of users subject to the plan.</p>			
Rationale	<p>Stakeholder participation is the key to coastal management. The ICM coordinating mechanism provides stakeholders (government and nongovernment) with access to decision making processes and activities. It provides concerned parties with the satisfaction that their views and concerns are taken into account in the planning and decision making process. The concerned sectors include those that exploit and use the natural resources for profit, communities that traditionally use natural resources for their food and livelihood, and the public sectors (local and central) that govern and manage the resources. Likewise, in order to achieve the targets of sustainable use and development of the oceans and coasts, the commitment of national agencies, local governments and concerned nongovernment stakeholders is essential. Thus, their respective programs, projects and activities should be aligned with the action plans, programs and policies identified in the coastal management plans.</p>			
Data requirements	<ul style="list-style-type: none"> • Representation of stakeholders in the coordinating mechanism • Staff and budget allocation of agencies in the coordinating mechanism 			
Guide Questions	<ol style="list-style-type: none"> 1. Are all the relevant organizations and stakeholders represented in the coordinating mechanism? 2. What are the commitments of the members of the coordinating mechanism and other primary stakeholders, in terms of personnel and budget allocations, and the integration of coastal management into their respective work programs? 3. Is there an existing process in place to monitor, evaluate and consolidate the activities of stakeholders in relation to the implementation of their respective coastal management plans? Who is responsible for implementing the monitoring and evaluation process, and who receives the output / report? 			



Results	<p>There are many activities of stakeholder’s participation such as citizen science monitoring, Masan Bay boat tour, public awareness and education program, marine litter cleanup and classification, joint activities with local agenda 21 and business sector, and other international cooperations.</p> <p>The key roles of Council are to approve reduction scheme and targets, build local capacity within the system and plan implementation, and increase public awareness on TPLMS. It was proven that public awareness is the core success factor for the TPLMS implementation, because citizens’ understanding, support, and voluntary compliance are crucial. Hence, the Council set out its comprehensive outreach programme to promote the value and consequences of the TPLMS implementation in restoring the clean environment of the Masan Bay.</p> <p>The Council sets a vision to transform the Masan Bay into a clean coastal city with scenic beauty (a so-called “Coastopia”) instead of the Bay with the worst water quality. With the efforts of its citizens, the Council is hoping Masan Bay to become an exemplary case for restoring its environment back to its once known as a beautiful Bay with clean sea water.</p>
---------	--

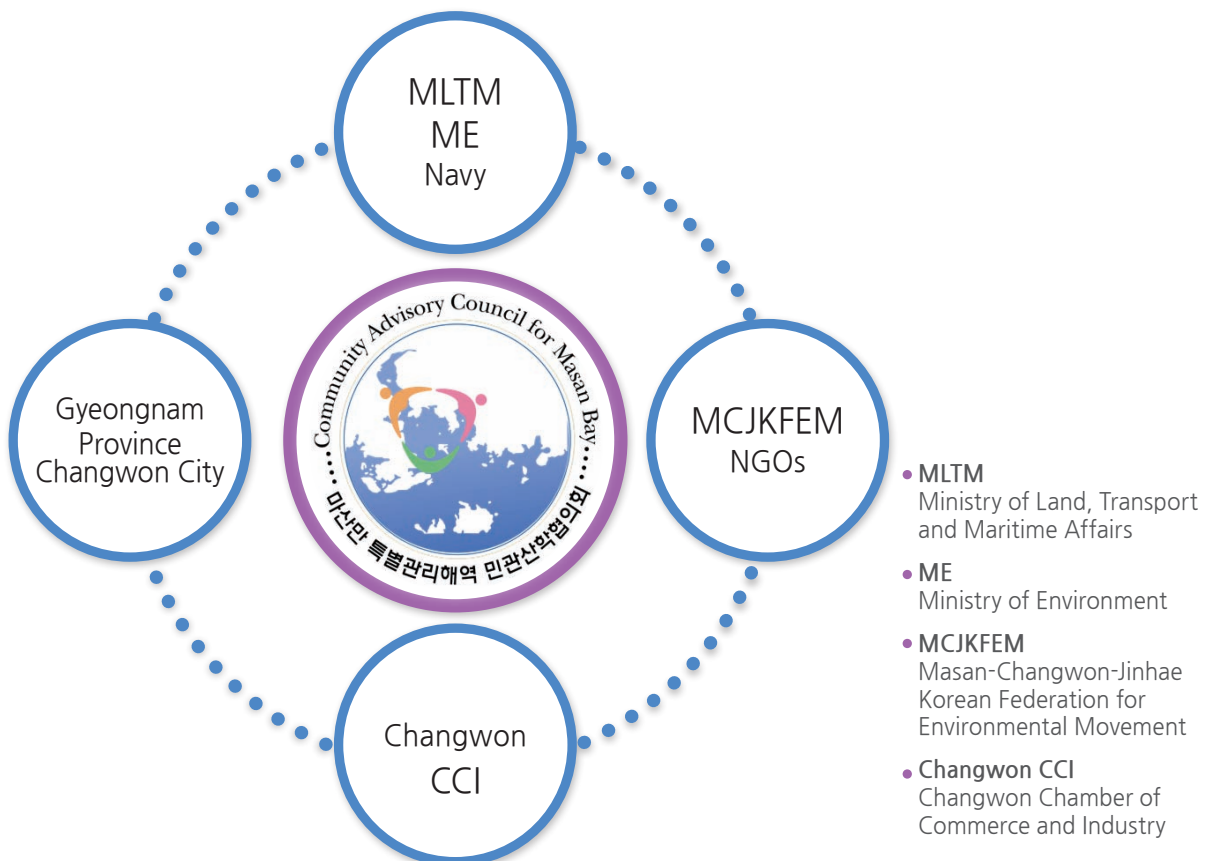




Figure 14. Organizational Chart of CAC For Masan Bay.

Table 5. Masan Bay TPLMS process in the CAC meetings

Date	Council Meeting	Agenda and Resolutions
05. 10. 26 05. 12. 19	1st and 2nd Meeting (Changwon city)	Launching CACMB Establishment of Operation Rule (MLTM #66)
06. 04. 14	3rd Meeting (Masan city)	Establishment of Public Relations (PR) Team
06. 07. 13	4th Meeting (Gyeongnam Province)	3-Stage PR Work plan LOGO
06. 09. 20	5th Meeting (Jinhae City)	Discuss water quality target Review of 1st stage PR activities
06. 12. 04	6th Meeting (Changwon city)	Review of actives and achievement 2006 Discuss Work Plan 2007
07. 05. 14	7th Meeting (Changwon city)	PR Work Plan Discuss about a target goal of TPLMS Education and Awareness Program
07. 09. 13	8th Meeting (Masan city)	Making a decision to have a target of water quality Allocation of reduction load to each city
07. 12. 21	9th Meeting (Gyeongnam Province)	3-Stage PR Work plan Award ceremony of UCC contest Action plan of TPLMS
08. 05. 20 08. 07. 07	10th and 11th Meeting (Changwon city)	3 Cites and NOAA MOU
08. 12. 04 09. 06. 26	12th and 13th Meeting (Gyeongnam Province) (Masan city)	PR Work Plan Discuss Work Plan 2009 Education and Awareness Program
09. 12. 17	14th Meeting (Kyungnam University)	- Review of actives and achievement 2009 - Discuss about Public Relations Program
10. 02. 19	15th Meeting (CECO)	- Discuss about Large Scale - Review of actives and achievement 2009
10. 12. 08	16th Meeting (Masan Regional Maritime Affairs and Port Office)	- Establishment of Operation Rule (MLTM #697)
11. 09. 23	17th Meeting (Masan Regional Maritime Affairs and Port Office)	- Discuss about 2nd TPLMS Action Plan - Public Participation and Education Program
11. 11. 08	18th Meeting (Masan Regional Maritime Affairs and Port Office)	- Discuss water quality target of 2nd TPLMS Action - Making discuss about Bongam wetland to make protected area - Public Participation and Education Program 2012
2012. 7. 19 2012. 9. 11	19th and 20th Meeting (Changwon city)	- Discuss water quality target of 2nd TPLMS Action (COD 2.2mg/L, T-P 0.041mg/L)
2012. 11. 22	21th Meeting (Masan Regional Maritime Affairs and Port Office)	- Public Participation and Education Program 2013 - Review of actives and achievement 2012



SOC Code	Category	Indicator	State	Trend
006	Legislation	ICM enabling legislation 연안역통합관리를 위한 법적 근거		
Description	This indicator describes the existence and adequacy of legislation enabling the implementation of ICM interventions.			
Rationale	The existence, adequacy and effectiveness of legislation are important in order to determine if the goals and objectives of coastal management are supported by a clear and enforceable legal basis. Legislation defines what is required, permitted and prohibited in the coastal and marine area. Awareness and understanding of coastal management legislation promotes compliance and therefore achievement of coastal management goals and objectives.			
Data requirements	<ul style="list-style-type: none"> • Legislations/local ordinances regarding ICM institutional mechanism and management activities • Coastal use zoning • Fisheries, mining and other extraction activities • Pollution-related activities • Building structures in the coastal environment, including aquaculture structures • Access to rules and regulations 			
Guide Questions	<ol style="list-style-type: none"> 1. Have any ICM-related policies been adopted and implemented by the local government? What are they? 2. What are the local laws that support ICM implementation (e.g., coastal use zoning, regulation of fisheries, aquaculture, mining and other extraction activities, pollution reduction and waste management, etc.)? Please specify whether the identified laws have been enacted at the provincial or municipal level, as well as the date. 3. How are rules and regulations disseminated and accessed by local people? 			
Results	<ul style="list-style-type: none"> - Coastal Management Act - Wetlands Conservation Act - Marine Pollution Prevention Act - Public Waters Reclamation Act - Public Waters Management Act 			

• Results and Recommendation

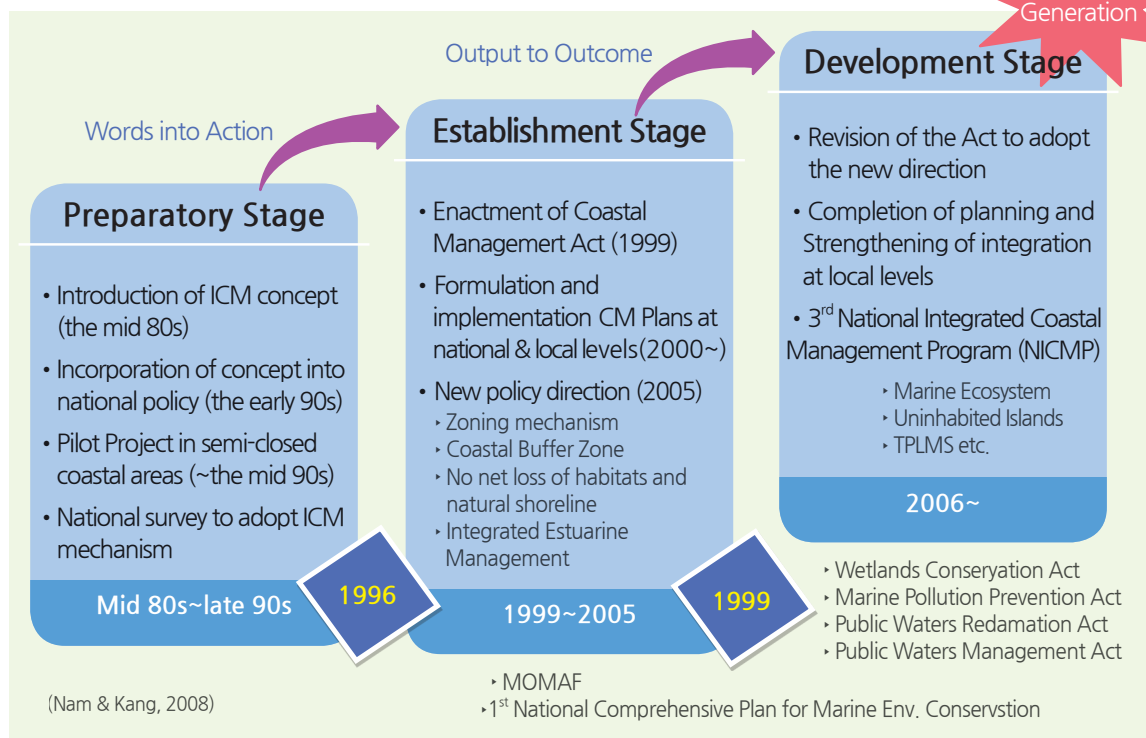


Figure 15. Institutional Development of ICM Policies in Korea

• Coastal Management Act

Sustainable Development of the coastal area should be promoted through ICM enabling legislation

• Purpose (Article 1)

- To conserve coastal environment and promote sustainable development of coastal area by specifying requirements for effective conservation, use and development of the coastal areas, thus, make the area more sound and rich for living
- “Sustainable development” refers to satisfying the needs of the current generation through sound development considering the environment capacity while ensuring environmental availability for future generation

• Management scope of coastal area (Article 2)

- Coastal areas consist of coastal Seas and coastal lands: coastal land should be developed to fulfil the needs of the current generation while ensuring geographical features, environment/ecosystem influence area and environmental availability.
- The land is classified as coastal area given its special features that seawater and land affect each other in the area, raising the need for integrated management

• Principle of coastal management (Article 3)

- It is specified that comprehensive and future-oriented management system should be adopted to ensure harmonious balance among ecological, cultural and economic values.
 - Ecological value refers to the value of wetland, biodiversity of species in ecosystem, etc.
 - Cultural value refers to not only the value of traditional lifestyles and thoughts of local residents but also that created from cultural and leisure activities taking place in the coastal area
 - Economic value refers to the value created from economic activities in marine, port and coastal industry



Designation of coastal area in Changwon City

- The total area of 119.98km² will be designated as the coastal area consisting of utilization, special, conservation and management coastal sea zone.

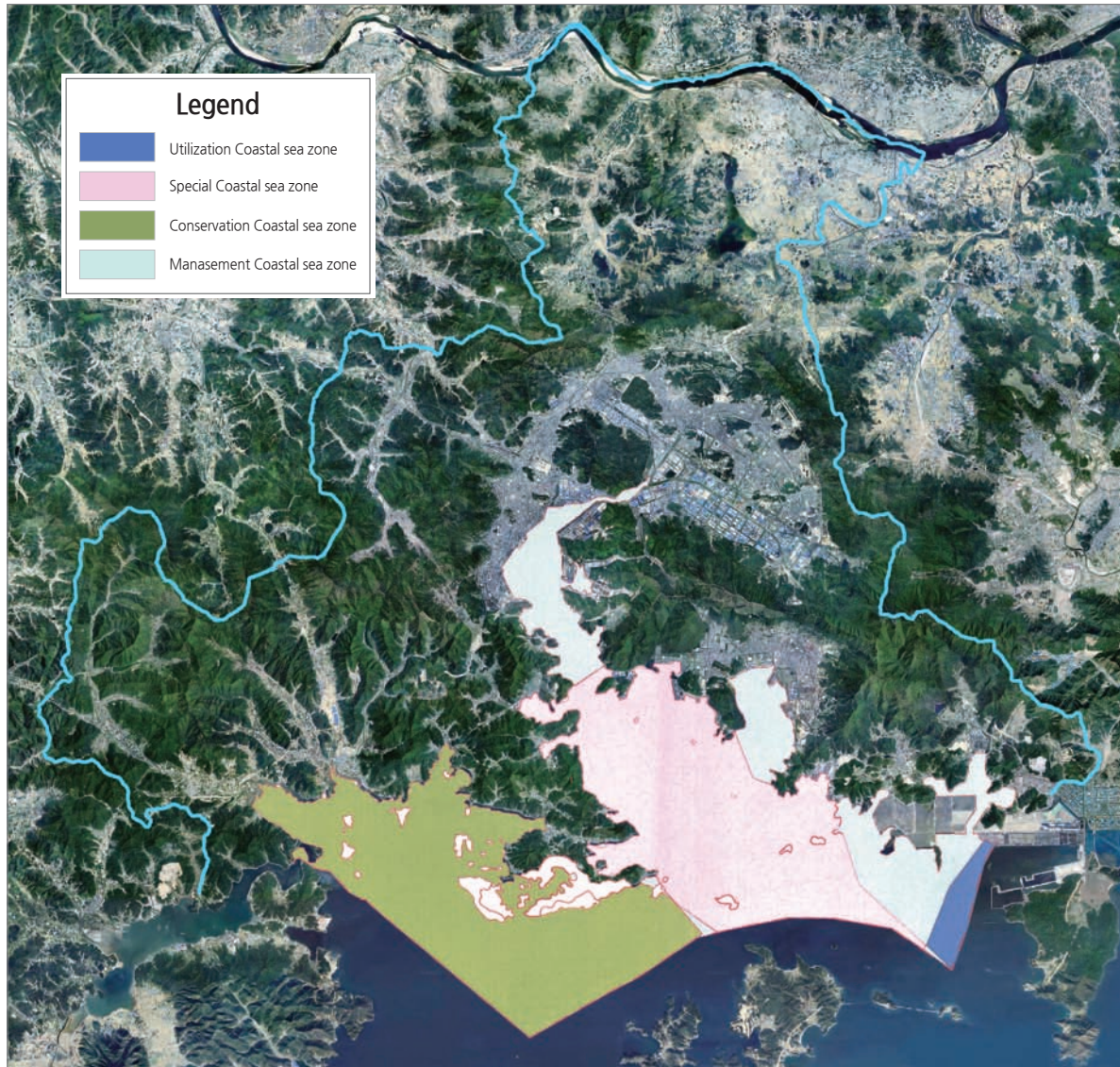


Figure 16. Overview map of designated coastal area in Changwon City





This small miracle enlightened people in the Masan Bay. They have found a hope that their efforts can make a difference, a difference that turns dead into life. Likewise, the people in the Bay believe that they can make the water as clean as before. Changes are happening slowly but surely, by the efforts of stakeholders of the Bay.



“I was able to catch more than 5 kg of clams within less than an hour. I felt that I was returned back to when I was child” said Ms. Kim Jumsoon in Jinhae City, who was born in Masan. She was amazed by the clams which appeared again in the mudflat.

In 1997 environmental monitoring, the Bongam mudflat was considered as dead having no living shellfish species found.

Figure 17. Harvesting clams in Masan bay

SOC Code	Category	Indicator	State	Trend
007	Legislation 해양환경분야 관련 법률 현황	Administration and monitoring of compliance to legislation 연안관리지원 법률에 관한 집행과 모니터링		



Description	This indicator reports the various types and frequency of inspections conducted in the area to determine compliance with coastal policies and legislation. It further looks into the effectiveness of enforcement of legislation.
Rationale	The available capacity within government to enforce laws and ensure compliance with coastal policy and regulations is paramount to successful implementation of ICM programs. The effective management of illegal and uncontrolled activities taking place along the coast and in coastal waters is an important step in addressing and minimizing unsustainable practices.
Data requirements	<ul style="list-style-type: none"> • Types of environmental compliance monitoring/inspection (i.e., market inspections for fishery violations; aquaculture; manufacturing, coastal polluting and coastal tourism establishments, ports and water transportation) • Frequency of environmental compliance monitoring/inspection including coastal patrols
Guide Questions	<ol style="list-style-type: none"> 1. What is the nature and extent of environmental compliance monitoring/inspection and enforcement being undertaken by the local government (i.e., market inspections for fishery violations; aquaculture; manufacturing, coastal polluting and coastal tourism establishments, ports and water transportation, coastal patrols), including areas covered, number and frequency of inspections, and who conducts the inspections? 2. How are economic activities regulated and monitored (e.g., issuance of permits)? Please indicate the number of permits issued. 3. Are there any changes in compliance monitoring activities (e.g., more frequent; more systematic)? Are there increasing demands for compliance monitoring as a consequence of economic activities? How have these demands been met?
Results	- A total of 7 illegal fishing cases were reported in Changwon in 2011

Table 6. Status of illegal fishing cases reported around Changwon in 2011.

City/County	Total	Three layers gill net	Fish trap	Gill net	Shrimp trawl	Coastal composite fishery	Demarcated fishery	Farming	Other
Total	204	14	8	8	0	7	21	16	130
Changwon City	7	0	1	2	0	3	0	1	0
Tongyoung City	51	0	0	4	0	3	11	11	22
Sacheon City	0	0	0	0	0	0	0	0	0
Geojae City	108	5	1	1	0	0	3	3	95
Gosung County	21	9	6	1	0	1	3	1	0
Namhae County	13	0	0	0	0	0	0	0	13
Hadong County	4	0	0	0	0	0	4	0	0

There were 204 incidences of illegal fisheries reported in Gyeongnam Province in 2011, and 7 among them were in Changwon City.



SOC Code	Category	Indicator	State	Trend
008	Legislation 해양환경분야 관련 법률 현황	Environmental cases filed/resolved 해양환경관련 소송, 법정사건, 벌금 등		

Description	This indicator reports the total number of cases filed and resolved, and the total value of fines issued for non-compliance of relevant coastal legislations.
Rationale	Effective enforcement of environmental legislation taking place in the marine and coastal areas can be reflected by the number of cases filed, resolved and fines collected resulting thereof. The strict enforcement of relevant legislation is an important step in addressing and minimizing unsustainable practices in the coastal areas.
Data requirements	<ul style="list-style-type: none"> • Total number of reported complaints • Total number of violations where violators were arrested • Total number of violations penalized • Total value of fines collected for non-compliance with relevant legislations
Guide Questions	<ol style="list-style-type: none"> 1. Does the local government record the number of: reported environmental complaints; environmental cases filed; and environmental cases resolved over time? What are the current trends in these three areas? 2. What proportions of environmental cases were resolved? 3. What were the penalties/fines issued, including violators arrested? 4. What is the level of commitment to enforcement (e.g., human; financial) for relevant laws? 5. What is the mechanism for monitoring progress from filing of environmental cases in court to its final resolution?
Results	- Cases Penalty are decreased

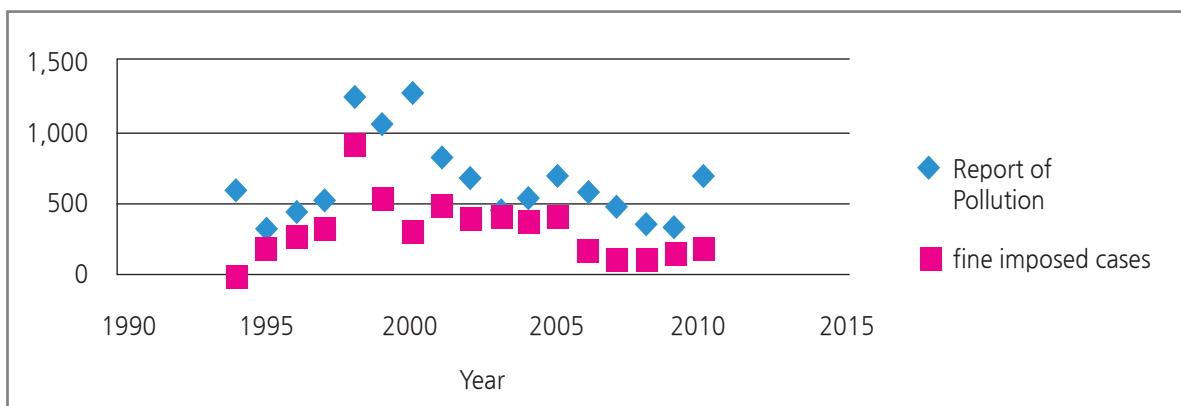


Figure 18. Status of marine pollution reported and fine imposed cases

Table 7. Marine pollution reported cases in Korea in 2011.

Year	No. of cases reported	Violations			
		Pollution	Obligation/ regulations	Administration	Minor violations ¹⁾
1994	631	365	38	228	0
1995	585	347	36	202	0
1996	767	375	107	285	0
1997	876	459	81	336	0
1998	2,315	621	754	940	0
1999	1,671	752	367	552	0
2000	1,641	819	500	322	0
2001	1,366	652	209	505	0
2002	1,841	565	159	424	693
2003	1,684	422	109	414	739
2004	1,824	523	117	383	801
2005	2,070	547	179	426	918
2006	2,216	465	328	186	1,237
2007	1,908	474	182	121	1,131
2008	1,785	355	92	157	1,181
2009	1,708	349	323	172	864
2010	2,135	702	135	149	1,149

Table 8. Cases reported via marine pollution penalties in Korea

Year	No. of cases reported	Penalties			
		Measures according to law	Fine	Warning	Others
1994	631	614	12	0	5
1995	585	348	202	0	35
1996	767	445	285	0	37
1997	876	531	336	0	9
1998	2,315	1,260	940	0	115
1999	1,671	1,081	552	0	38
2000	1,641	1,289	322	0	30
2001	1,366	841	505	0	20
2002	1,841	706	424	693	18
2003	1,684	469	414	739	62
2004	1,824	563	384	799	78
2005	2,070	709	426	918	17
2006	2,216	597	186	827	606
2007	1,908	504	121	260	1,023
2008	1,785	366	124	395	900
2009	1,708	351	163	377	817
2010	2,135	706	196	590	643



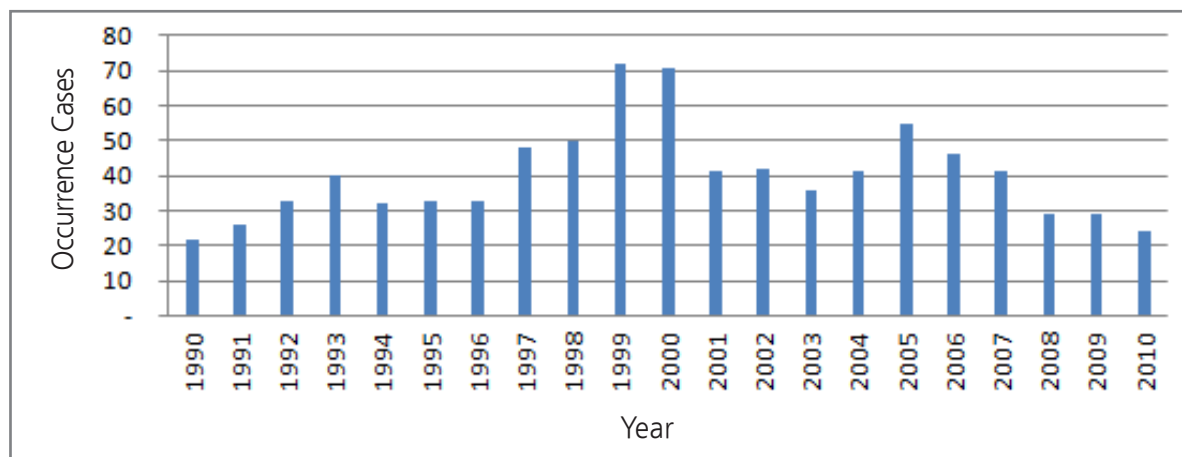




Figure 19. Occurrence of marine pollution accidents

Table 9. Cases reported via marine pollution accident in Gyeongnam province

Classification		2008	2009	2010
Pollution accident	No. of cases	29	29	24
	Outflow discharge(kℓ)	9.2	6.0	127.5
Control measures	No. of cases	19	22	22
	Outflow discharge(kℓ)	8.9	5.8	127.4
Control measures implementation rate(%)		65.5	75.9	91.7
Resources utilized	No. of vessels	92	61	99
	No. of oil skimmers	10	6	15
	Oil fence(m)	1,120	1,280	660
	oil adsorbent(kg)	1,824	2,621	3,938
	Dispersant(ℓ)	36	743	36
Amount collected	Split oil(kℓ)	7.1	16.5	153.6
	Waste(t)	23.7	12.6	15.0

SOC Code	Category	Indicator	State	Trend
009	Information and public awareness 대중인식증진 사업에 관한 정보	Public education and awareness 연안환경대중인식 교육 사업 시행 여부		

Description	This indicator reports on communication plans, staff and budget allocations, and public awareness programs initiated by various sectors, and the different communication channels used to promote public awareness.
Rationale	Easy access to information can promote awareness of stakeholders. Public education promotes increased awareness of the value of the coastal and marine resources, the issues affecting the environment, and the need for coastal management to protect and conserve these resources.
Data requirements	<ul style="list-style-type: none"> • Communication plan available • Budget and staff allocation for implementation of communication plan • Local governments have facilities for public access of information • Local awareness programs • Frequency of community participation activity • Number of participants in community participation activity
Guide Questions	<ol style="list-style-type: none"> 1. Has communication plan been formulated? What are the major issues covered in the plan? 2. How is the implementation of the communication plan ensured? Describe local government's staff and budget allocation for the implementation of the plan. 3. Is information on coastal management available and accessible? 4. What are the principal local awareness building programs? Describe briefly their scope, frequency, target audiences and levels of participation (i.e., number of participants). 5. Are there any regular community participation activities being conducted? Please describe them briefly including changes that have occurred as a consequence of such activities and the number of participants participating in the activity through time.
Results	Public Awareness Programme: As one of core activities, the Council set out public awareness programme, which include: TPLMS education programme, citizen's monitoring, publications, international collaboration including PEMSEA, NOAA and NGO support, among others. These activities were proven successful in providing information relating to the environmental protection and restoration and implementing the TPLMS.



• Results and Recommendation

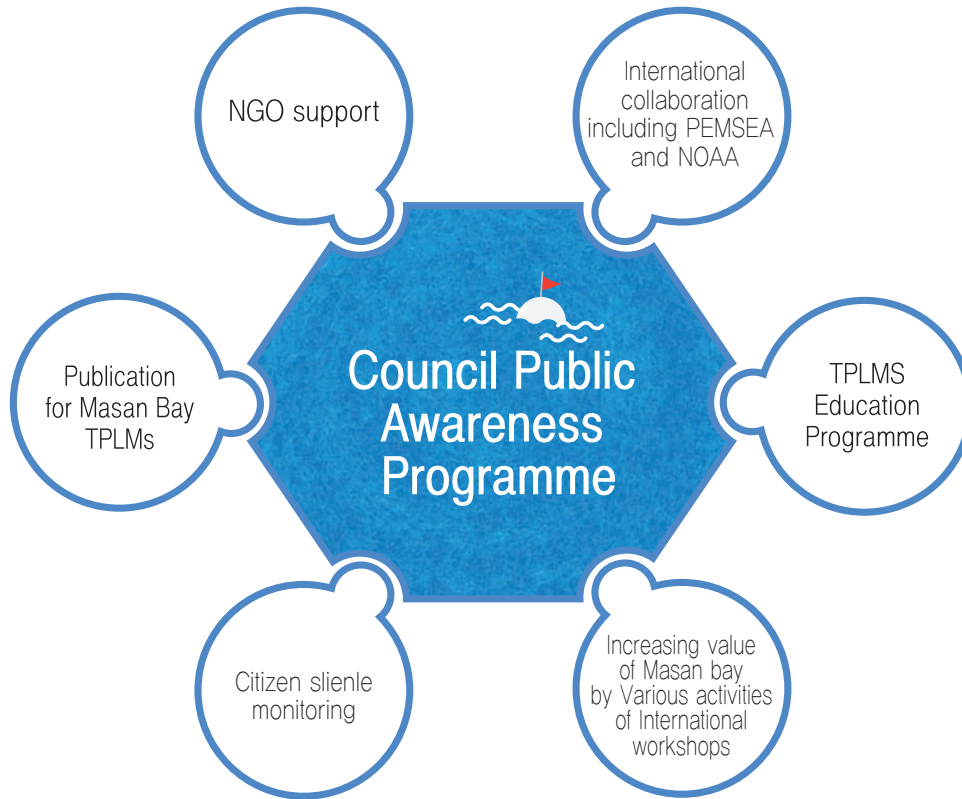


Figure 20. Council Public Awareness Programme For Masan Bay.

a. Public Campaign

Through the implementation of the TPLMS, the Council envisions making Masan Bay suitable for swimming and fishing within the Bay by 2020. To achieve this goal, the Council urged its citizens to participate in voluntary reduction of pollutants, for example, recycling of waste cooking oil and reduction of wastewater from washing machines. Campaign materials were produced and broadcasted on public TV.



b. Eco-tour programme

As an effort in protecting and restoring the environment of the Bay, the government assigned the Bongam mudflat as a protected area. To raise the public awareness of the importance of the ecosystem, the Council established an eco-tour programme which provides citizens an opportunity to witness the restoration of the ecosystem and the service that ecosystem provides.



c. Drawing and UCC contests

To enlighten the young generation on the importance of the environment, the Council has been organizing drawing and User Created Contents contests with the theme of “Happy Bay: living Sea and Mudflat.” The activity significantly increased the awareness of environment among youth groups.



d. International Cooperation

In developing the TPLMS at Masan Bay, the Twinning Workshop (a PEMSEA initiative) has been played a key role in providing technical information and publicity. The 1st Twinning Workshop was held in Masan on June 2005 where experts and officials at various Twinning sites have gathered to discuss the development of the system and share the experiences at the respective Twinning sites. Represented by Council Chair, Masan has been actively involved in subsequent Twinning Workshops.



e. Washing Machine relocation campaign for reduction pollution loads in streams.



f. Fishing waste collection campaign



낙시관리 및 육성법 (제정 2011.3.9 법률제10458호)을 아시나요?

낙시관리 및 육성법은 건전한 낙시문화 조성, 수산자원 보호, 낙시 관련 산업 및 농어촌의 발전과 국민의 삶의 질 향상을 위해 제정되었습니다. 법률 중 깨끗한 낙시터와 바다생물의 안전을 위해 눈여겨 볼 조항입니다.

제7조(수면 등에서의 금지행위) 누구든지 제3조 각 호의 수면 등에서 낙시를 하는 경우에는 다음 각 호의 행위를 하여서는 아니 된다.

1. 낙시도구나 미끼를 낙시 용도로 사용하지 아니하고 버리는 행위

제55조(과태료) ① 다음 각 호의 어느 하나에 해당하는 자에게는 300만원 이하의 과태료를 부과한다.

2. 제7조제1호를 위반하여 낙시도구나 미끼를 낙시 용도로 사용하지 아니하고 버린 자

2 시민참여 캠페인

'월척 낚고, 낙시 쓰레기는 되가져 가세요.'

5. 29(일) 13:30-15:30
귀산동 마창대교 아래

낙시쓰레기, 작고 조각난 쓰레기!

우리의 눈살을 찌푸립니다. 바다생물의 생명을 위협합니다.

낙시에 꼭 필요한 낚시바늘, 낚시줄, 낚시추. 그치명적 위험! 어떻게 생각하세요?





▲ 하와이섬의 엘비트로스의 죽음 ©Save Our Seas, Tom Campbel

▲ 남쪽에 중독되어 죽은 큰고니 ©김영준

▲ 부리에 낚시바늘이 걸린 꿩이갈매기 ©최종수



g. Coastal clean-up activities



h. Public Participation and Education Program





I. TPLMS Workshop For gov. officials,



j. International Coastal Clean up Day



SOC Code	Category	Indicator	State	Trend
010	Information and public awareness 대중인식증진 사업에 관한 정보	Stakeholder participation and mobilization 이해당사자 참여와 기회 부여 정도		

Description	This indicator reports the number of nongovernment organizations, civil society groups and other stakeholders' organizations who are contributors to sustainable development of the coastal and marine area.
Rationale	The active involvement of stakeholders reflects their understanding on the value of implementing coastal management and mobilizing activities related to it.
Data requirements	<ul style="list-style-type: none"> • Nongovernmental organizations, civil society groups and other stakeholders' organizations with environment related programs and activities • Types of environment related programs and activities • Number of members
Guide Questions	1. Identify nongovernment, civil society and other stakeholders' organizations in the area that have environmental related programs and activities, including number of members and types of programs and activities.
Results	Shown as below

• Results and Recommendation



Changwon water and life civil Association :

With desire to revitalize Masan Bay, Masan People's Coalition for Masan Bay Restoration was launched after Masan Bay was designated as a special management area. In order to improve water quality of the bay and restore the marine ecosystem, a series of activities were conducted to prevent reclamation of Masan Bay and raise people's awareness. In addition, Masan Solidarity for River Restoration and Changwon People's Coalition for River Restoration have carried out site-directed and policy-oriented river restoration activities since its establishment with an aim to restore ecosystem and water cycle around rivers of downtown area. Masan, Changwon and Jinhae integrated into one city, integrated Changwon, on 1 July 2010. A number of environmental issues are yet to be resolved in these areas and active response activities to address such issues should be conducted based on each city's features. In this regard, the existing organizations including Masan People's Coalition for Masan Bay Restoration, Masan Solidarity for River Restoration and Changwon People's Coalition for River Restoration established the integrated people's solidarity, Changwon People's Coalition for Water and Life, in order to enhance operation efficiency and campaign effectiveness.

Table 10. NGOs, NPOs, and Governance organizations related to coastal environment

Name of organization	Number of Members
Kyungnam University Coastal Total Pollution Load Management Center, Kyungnam University	15
Gyeongnam Ramsar Environmental Foundation	10
Green Gyeongnam 21 Promotion Committee	50
Green Changwon 21 Execution Committee	94
Gyeongnam Green Start Network	30
OSEAN	60
Gyeongnam Green Environment Support Center	20
Masan YMCA	1,000
Changwon People's Coalition for Water and Life	200
Catholic Women Center	1,500
Masan YWCA	1,200
Gyeongnam Forest Revitalization Campaign, Corp.	30
Green Naeseo People's Association	150
People's Coalition for Habpo Bay Restoration	40
Korea Institute of Environmental Ecology, Corp.	120
People's Coalition for Masan, Changwon, Jinhae Environmental Campaign	700
Changwon YMCA	1,300
Gyeongnam Grassroot Environmental Education Information Center	100
Gyeongnam Hansalrim Environmental Education Center	3,000
Towoel Stream Diving Beetle	10
Firefly Association	50
The Korean People Artist Federation Masan Branch	100
People's Coalition for Ocean Restoration Campaign Gyeongnam Office	20
Machangjin People's Solidarity for Participatory Democracy	300
Jinhae Seniors Club	50
Total	10,149



SOC Code	Category	Indicator	State	Trend
011	Capacity development 역량 개발	Availability/accessibility 가능성과 실현성		
Description	This indicator reports access to facilities and training programs, staff and budget allocation, and technical resources available for coastal management. It also measures the extent to which local personnel can impart their knowledge and experiences in coastal management as well as the presence of universities, research institutions and local experts in the area.			
Rationale	Building local capacity to plan and manage their own resources is essential in ICM programs. Similarly, access to facilities and training programs, and budget allocation are essential in building local capacity. Local capacity is also enhanced by the availability of institutions such as universities, research institutions and local experts, which can be tapped in implementing coastal management activities and training and education programs. Local personnel with the appropriate skills must be able to impart their knowledge and experiences in coastal management to other coastal and natural resource managers.			
Data requirements	<ul style="list-style-type: none"> • Access to facilities and training programs • Staff and budget allocation for capacity development • List of experts • Universities and research institutions in the area with related courses/ research activities • Local capacity to conduct trainings 			
Guide Questions	<ol style="list-style-type: none"> 1. Do local personnel have access to facilities and training programs to strengthen local capacity for ocean and coastal management? What are they? 2. What has been the staff and budgetary commitment to the ICM program over time? 3. What has been the budgetary allocation for capacity development over time? 4. Has a roster of experts been developed? How has the roster of experts been employed? 5. Which universities and research institutions in the area are providing ICM-related courses or research activities? 6. Are there any local capacities to conduct ICM trainings? 			
Results	<ul style="list-style-type: none"> - CRERC in Kyungnam Univ - KORDI - Gyeonnam Ramsar Environment Foundation - Agenda 21, Changwon YMCA, etc. 			

• Results and Recommendation



Changwon City educated citizens with the knowledge, skills, behavior, and values which were required to maintain sustainable environment and nurtured 274 professional, social,

and environmental education specialists to provide such education, laying a foundation for continuous education. Furthermore, environmental education programs related to lifelong learning was provided to 14,613 citizens.

Table 11. Access to facilities and training programs in ChangWon

Name of programs	Purpose
Masan Bay Coastal Area Ecological and Environmental Investigation	To provide opportunities to understand pollution and recovery process by learning features and history of marine environment of Masan Bay
Masan Bay Biota Research Competition	To provide opportunities to understand benefits of mud flat by experiencing and observing organisms in wetland
Masan Bay Coastal Total Pollution Load Management Training	To understand coastal area total pollution load management system and marine environment
Masan Bay Bongam Mud Flat Ecological Education	To educate wetland ecosystem recovered through efforts made by private and public sectors
Changwon Marine City Coastal Wetland School	After EAS Congress 2012, to educate Masan Bay ecosystem recovered through efforts made by private and public sectors
Changpo Bay Citizens Monitoring and Bongam Mudflat Citizens Monitoring	To provide opportunities to understand Bongam Mudflat and Changpo Bay by learning features and history of marine environment of Masan Bay
Operation of Climate Change Response Education Center	To understand climate change crisis, establish response system and operate privately led education center to spread green lifestyle
Development of Primary School Environmental Education Materials	To provide more opportunities to learn the environment and establish a foundation for enhanced education environment at school and cultivate students to practice green lifestyle
Distribution of Changwon Green Children Environmental Education Materials	To educate primary school students through systematic environmental education and enhance environmental education at school
Establishment and Operation of Gyeongnam Environmental Education Network	To provide more quality education data and opportunities by networking programs covering environment exploration, renewable energy, climate change, etc.
Hosting Changwon Environmental Movie Festival	To recognize environmental issues and raise awareness by sharing the current environmental issues and agenda
Nurturing Environmental and Ecological Commentators	To nurture social and environmental education providers with appropriate environmental values and enough experience in environment exploration and foster professional environmental commentators who can promote the beautiful environment
Nurturing Professional Climate Commentators	To provide early education on climate change and energy use to nurture climate guards who promote green lifestyle which may reduce greenhouse gas
Ecological Education for Junam Reservoir	To promote Junam reservoir, the representative environmental brand in Changwon, and provide class on wetland migratory birds to raise environmental awareness on wetland
Education and Activity Support to Nurture Green Leaders	To encourage public to practice green lifestyle by taking initiative and increasing the number of qualified green leaders
Establishment and Operation of Green Life Campaign Group	To establish low carbon, green lifestyle environment by utilizing resources and energy in a wise and eco-friendly manner
Education to Nurture Green House Gas Evaluator	To promote and identify green family via town or apartment-based assessment by nurturing green house gas evaluator
Education to Nurture Environment Guards at Military Camps	To resolve environmental issues at military camps and raise awareness on environment
Operation of Changwon Environmental School	To encourage public to pay more attention and take part in making Changwon an environmental capital of Korea by providing them opportunities to learn general environmental knowledge and experience environment exploration



SOC Code	Category	Indicator	State	Trend
012	Capacity development 역량 개발	Human resource capacity 연안환경 관련 인력 현황		

Description	This indicator measures the local capacity in implementing coastal management in terms of skilled human resources.
Rationale	The knowledge and skills of local personnel is essential for effective implementation of coastal management.
Data requirements	<ul style="list-style-type: none"> • Number of people trained in ICM • Number of skilled personnel working in ICM programs • Number of graduates in ICM-related courses • Number of required ICM trained people
Guide Questions	<ol style="list-style-type: none"> 1. How many people have been trained in ICM and how many of the trained individuals are working in ICM? 2. How many personnel working in the ICM program are graduates of ICM-related courses (natural and social sciences, economics, etc.)? 3. Is there a need for ICM training? How many government and non-government personnel require ICM training? 4. Is there a mechanism to track if those trained are applying the new acquired skills, and to determine who needs and what level of training is required? What is it? 5. Are there other capacity development needs related to the ICM program development and implementation? What are they?
Results	<p>ICM Program was established for the first time in Korea at Kyungnam University, Changwon. About 20 environmental specialists and public officials in the region have completed the course, establishing the foundation to nurture public environmental specialists.</p> <p>Education on marine environment, Masan Bay Restoration Program, was provided to cultivate people to appreciate the ocean and preserve the environment in their daily lives by increasing people's awareness on the environment and educating them on the importance of the marine environment (a total of 3,463 people attended the program from 2002 to 2011).</p>

• Results and Recommendation

Specialized education to foster specialists: Providing ICM Program at Kyungnam Graduate School



After ICM legislations were passed at the National Assembly in 1999, the Ministry of Maritime Affairs and Fisheries discussed and modified ICM plans with the Ministry of Agriculture and Forestry, Government Administration and Home Affairs, Construction and Transportation and Commerce, Industry and Energy and the relevant local government and established ICM plans as the national basic plans in June 2000. The plans covered coastal area ecosystem enhancement measures and reviewed various coastal area development plans.

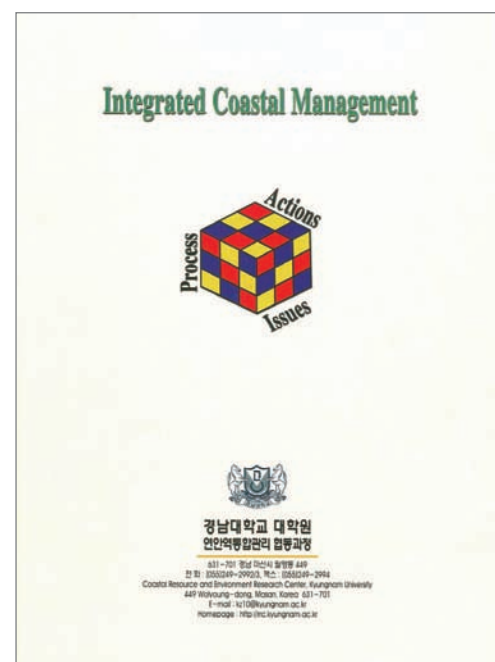
In order to nurture specialists required to implement the ICM, Gyeongnam University established the ICM cooperation program for the first time in Korea. ICM studies not only environment-related scientific technologies which help to determine priorities, identify the optimal solution and establish implementation plans but also environmental economy laws and system establishment, integration of administrative agencies and their roles and the role of media to encourage public participation.

ICM encompasses a range of stages coordinating many development or environment enhancement projects promoted merely based on economic grounds. ICM is a dynamic paradigm supplementing and modifying the integrated management system through the following steps:



1. Set goals to enhance quality of living
2. Determine scope and area for integrated management
3. Environmental assessment
4. Prepare implementation measures
5. Coordinate and allocate responsible agencies and organizations
6. Secure fund and implement through system measures and legislations
7. Conduct monitoring and interpret data

To respond to the changing trends in the 21st century, Kyungnam University's ICM Master course Program was established in 2001 for the first time in Korea and has provided specialists required for various sectors.

- ◆ Specialized education program to nurture specialists: supply of qualified specialists
- Provided researchers opportunities to learn advanced technologies in overseas technical training courses
- Provided researchers opportunities to visit business sites to prepare themselves prior to working
- Established and provided ICM program in graduate school, Kyungnam University: environmental specialists and public officials in the region may benefit from completing the course, laying a foundation to foster public environmental specialists.



Picture 21. Application Guidelines for ICM Program at Kyungnam University (Graduate School Program)

SOC Code	Category	Indicator	State	Trend
013	Financing mechanisms 재정 관계	Budget for ICM (integrated coastal management) 연안 통합관리 계획 작성 예산 반영 여부		



Description	This indicator reports the financial requirements for coastal management and the government allocation including investments for environmental infrastructures. It also looks into the financial sources for coastal management, such as loans, and grants from financing institutions and donors.
Rationale	The activities for coastal management have specific budgetary requirements and thus need financial allocation for their implementation.
Data requirements	<ul style="list-style-type: none"> • Total budget identified for coastal management • Total budget allocated by LGU • Total expenditure for coastal management • Grants and loans from external sources • Investments in environmental infrastructure
Guide Questions	<ol style="list-style-type: none"> 1. What has been the annual budget for ICM implementation over time? 2. Is there a financing system supporting the continued implementation of the ICM program? What is it? 3. Is there a system for tracking and reviewing budget allocations and expenditures on an annual basis for ICM and related activities? What is it? 4. Are there any past and existing grants or loans from external sources for ICM and related activities? What are they? 5. Has the local government invested in environmental infrastructure? What was the investment, and how were the funds raised?
Results	Environment management Masan Bay budget was 0.1 billion KRW in 2012. (Shown in Table14)

Table 12. The Korean government's budget allocation for marine environment (2009-2012)

(Unit: $\times 10^8$, KRW)

Classification	2009	2010 (①)	2011 (②)	2012 (③)
Total	1,908	1,816	1,827	1,524
□ Coastal environment management	691	741	880	223
• Coastal management	62	52	50	200
• Coastal improvement	431	428	524	373
• Marine tourism facilities establishment	132	162	139	167
• Dredging operation of polluted area	66	99	167	123
□ Marine ecosystem conservation and restoration	85	97	111	108
• Marine protection area management	45	48	46	51
• Marine ecosystem investigation and management	40	34	40	37
• Wetland ecosystem restoration	-	15	25	20
□ Marine environment improvement and management	105	162	380	218
• Environment/sea waters management (Masan Bay)	69 (12)	69 (12)	157 (10)	94 (10)
• Marine environment, international cooperation, etc.	36	33	30	69
• Elimination of dead oil from sunken vessels	-	60	193	-
□ Marine pollution restoration support	641	444	256	123
□ Establishment of Institute of Marine Biological Resources	227	257	130	-
□ Regional development center support	159	115	70	290
• Establishment of Marine Bio-Venture Capital Support Center	19	20	-	227
• Establishment of Marine Resources Research Center	40	25	-	-
• Regional technology innovation project	100	70	70	63



SOC Code	Category	Indicator	State	Trend
014	Financing mechanisms 재정 관계	Sustainable financing mechanisms 지속가능한 재정 확보 여부		

Description	<p>This indicator takes account of the institutionalization of measures and means to support environmental conservation and environmental infrastructure improvements. Economic and market-based instruments, such as public-private partnerships, environmental user fees, user pay schemes, and corporate social responsibility (CSR) programs are among the tools being considered. The indicator also considers policies and programs put in place to enhance the climate for public and private sector financing of coastal management activities and for constructing and operating environmental infrastructure.</p>
Rationale	<p>Financial support for coastal management implementation may come from different sources. The sustainability of ICM programs is dependent on how revenue sources are developed and managed. Transparency in all financial transactions is necessary to avoid suspicion from stakeholders. Apart from regular allocation from the government, various financing options must be explored to sustain financial inputs for coastal management activities and environmental infrastructure and service.</p>
Data requirements	<ul style="list-style-type: none"> • Corporate social responsibility • Private sector financing (e.g., PPP) • Environment user fees • Percentage of environment user fees allocated to environment projects • Private sector investment for environmental infrastructure • Standard procurement process in place (e.g., defined ceilings for bidding, canvassing, and shopping) • Provincial/city/municipality authorized to engaged in public-private partnership
Guide Questions	<ol style="list-style-type: none"> 1. What financing instruments are being implemented by the local government in support of environmental programs, such as polluter pays, environment user fees, public-private partnerships, etc.? Please indicate the amount of revenue generated through the different instruments. 2. If there are existing environment user fees, what proportion of the collection is allocated for environmental projects? How has this changed over time? 3. Is the local government authorized to engage in public-private partnerships (PPP)? What (if any) are the past and current PPP transactions? 4. What is the procurement process of the local government for environmental infrastructure?

Results

Central government keeps providing financial support for Masan Bay TPLMS as one of SMA(Special Mangement Area) and local government has a supplemental financing mechanism.

Since 1999, Daewoo Department Store, located in Changwon City, has been donating 10 million Won (about 10 thousand USD) every year for the Masan Bay environmental public awareness programs conducted by local NGOs.

Samsung Techwin, Dusan Heavy Industry, and STX Engine have been supporting Masan Bay conservation campaign broadcasted through Gyeongnam MBC, a local television channel.

Gyeongnam Bank, a local bank based on Gyeongnam Province, has been issuing Gagopa Love Credit Card with cooperation from Daewoo Department Store. Gyeongnam Bank is donating money equivalent to 0.2% of the Gagopa Love Credit Card balance to Local Development Fund managed by Changwon City. The Fund is mainly used for the conservation of Masan Bay.





Figure 22. Still cut of Masan Bay conservation campaign broadcasted through Gyeongnam MBC



Figure 23. Gyeongnam Bank's Gagopa Love Credit Card ※

※ Gyeongnam Bank is donating money equivalent to 0.2% of the Gagopa Love Credit Card balance to Local Development Fund managed by Changwon City. The Fund is mainly used for the conservation of Masan Bay.

SOC Code	Category	Indicator	State	Trend
015	Natural and man-made hazard prevention and management 환경 피해 예방 제도 및 관리 정책	Level of preparedness for disasters 환경 재난 예고 체제 수립 여부		
Description	This indicator measures the availability of disaster preparedness and management plans, capable people, equipment, budget and preparations to anticipate, reduce, respond to, and recover from various hazards/disasters.			
Rationale	Local communities and disaster management personnel must be prepared to respond to various hazards, if the number of deaths and property losses due to natural and man-made hazards are to be minimized. Moreover, proper preparation and mitigation measures can reduce the frequency (of man-made disasters) and severity of disasters.			
Data requirements	<ul style="list-style-type: none"> • Availability of natural/man-made disaster/environmental emergency response plan • Scope of natural/man-made disaster/environmental emergency response plan (e.g., floods, earthquakes, oil specify, etc.) • Identification of mitigation strategies • Institutional mechanism for the implementation of the emergency response plan • Number of trained and non-trained personnel allocated • Early warning system in place • Availability of adequate equipment • Budget allocation for natural/man-made disaster 			
Guide Questions	<ol style="list-style-type: none"> 1. Has a natural/man-made disaster/environmental emergency response plan(s) been prepared for the area. What is the scope of the response plan(s), including description of the institutional mechanism(s) for implementation? 2. Has the local government developed a mitigation strategy to reduce the risk(s) associated with identified hazards? 3. How many trained and non-trained personnel are allocated for the implementation of the disaster response plan(s)? 4. What equipment is available for implementation of the disaster response plan(s) and is the equipment fully compliant with the plan(s)? 5. What is the annual budget allocation for operations relating to natural/man-made disaster prevention? What changes (increase/decrease) have occurred in the financial allocation over time? 6. Is there any early warning system in place? What is it, including year of its establishment and coverage? 			
Results	- Changwon City will introduce a new service via smartphone app called National Emergency Safety Center Service			

• Results and Recommendation

In response to a rapid increase of smartphone users recently, Changwon City will introduce a new service via smartphone app called National Emergency Safety Center Service from next year, diversifying means to report disaster in order to minimize public inconvenience. The app offers a variety of services including disaster alert covering special weather report, regional disaster report and large-scale accident report and emergency safety tips showing what to do in case of typhoon, heavy rain, fire and emergency care. Users can search for emergency shelters, refugee camps and emergency medical centers and the service also offers useful information via evacuation shelter search service to view any public offices, disaster report service to upload pictures or video clips to report any disaster to the local government and civil defence training information service covering training schedule, venue, plans and contact details.



안전을 내려받으세요!

- 재난이 발생했는지 어떻게 알지?**
재난상황 알림

→ 기상특보정보, 지역별 재난발생정보, 대규모 사고정보 등을 실시간으로 알려드립니다.
- 재난이 발생하면 어떻게 해야할까?**
국민행동요령 조회

→ 태풍·호우, 화재, 응급처치법 등 국민행동요령을 조회할 수 있습니다.
- 재난이 발생하면 어디로 대피할까?**
대피시설 조회

→ 민방위대피소, 이재민수용소, 응급의료센터, 관공서 등을 조회할 수 있습니다.
- 내 주변에 재난이 발생하면 어떻게 하지?**
재난상황 신고

→ 재난피해상황 등을 사진 또는 동영상에 첨부하여 관할 지자체에 직접 신고할 수 있습니다.
- 내가 원하는 날짜에 실시하는 민방위 교육은?**
민방위 교육훈련정보

→ 지역별 민방위 교육일정, 교육장소, 훈련계획, 연락처 등을 조회할 수 있습니다.

**앱스토어, 안드로이드 마켓에서
"국가재난안전센터"를 검색하세요.**

안드로이드폰

아이폰

QR코드를 찍으면 앱을 내려받을 수 있습니다.

행정안전부 | 교육부 | 창원시
창원시 재난안전대책본부 <http://bangjae.changwon.go.kr>

Figure 24. Changwon National Emergency Safety Center Service (Smartphone App)



Table 13. Criteria for disaster breaking news in Changwon City

Type	Watch	Warning			
Gale	Wind speed of 14m/s or higher or instantaneous wind speed of 20m/s is expected on land; however, as for mountain area, wind speed of 17m/s or higher or instantaneous wind speed of 25m/s or higher would apply	Wind speed of 21m/s or higher or instantaneous wind speed of 26m/s is expected on land; however, as for mountain area, wind speed of 24m/s or higher or instantaneous wind speed of 30m/s or higher would apply			
Wind and waves	Wind speed of 14m/s or higher remains for more than 3 hours on the sea or significant wave height is expected to exceed 3m	Wind speed of 21m/s or higher remains for more than 3 hours on the sea or significant wave height is expected to exceed 5m			
Heavy rain	Rainfall is estimated to be more than 70mm for 6 hours or 110mm for 12 hours	Rainfall is estimated to be more than 110mm for 6 hours or 180mm for 12 hours			
Storm surge	Sea-level is expected to rise higher than the maximum standard level due to multiple factors including astronomical tide, typhoon, storm and low pressure; however, different maximum standard level will be set according to region	Sea-level is expected to rise higher than the maximum standard level due to multiple factors including astronomical tide, typhoon, storm and low pressure; however, different maximum standard level will be set according to region			
Tsunami	7.0 magnitude of submarine earthquake occurs around the Korean Peninsula waters (21N~45N, 110E~145E), causing 0.5 to 1.0m or lower tsunami wave	7.5 magnitude of submarine earthquake occurs around the Korean Peninsula waters(21N~45N,110E~145E), causing 1.0m or higher tsunami wave			
Typhoon	State of gale, wind, waves and heavy rain is expected to reach warning level due to typhoon	Wind speed of 17m/s or higher or rainfall of 100mm or higher is expected due to typhoon; however, the below table should be used for classification according to wind speed and rainfall			
			Level 3	Level 2	Level 1
		Wind(m/s)	17~24	25~32	33 or higher
Rain(mm)	100~249	250~399	400 or higher		

Table 14. Guidelines based on different disaster stages and situations in Changwon City

Stage	Situation	No. of employees required
Preparation	Preparation breaking news is issued for possible disasters and pre-response system needs to be taken	Preparation breaking news One or more employees from disaster response department are required
	Advisory is issued for possible disasters and pre-response system needs to be taken	Advisory: One third of all employees are required (administrative guidance in town and village)
Emergency	Possibility of disaster in the region is high enough to issue warning, raising the need to take emergency response system considering the actual possibility of damage	Warning: Half of all employees if required (administrative guidance in town and village)
Full alert	In case of disaster	All employees if required (disaster area)



SOC Code	Category	Indicator	State	Trend
016	Natural and man-made hazard prevention and management 환경 피해 예방 제도 및 관리 정책	Degree of vulnerability to disasters 환경 피해 민감도 조사		

Description	This indicator measures the degree to which populations are at risk of exposure to natural and man-made hazards; that is, populations living within various hazard zones.
Rationale	The greater the degree of potential exposure to natural and man-made hazards, the more that government and local communities should be prepared and must put in place mitigation measures for disasters. Identification of the levels of threat from various hazards can also help focus preparations on the most relevant types of threat.
Data requirements	<ul style="list-style-type: none"> • Possibility of Multi-hazard (landslides, storms, floods, etc.) map • Number of people located in hazard prone areas • Number of people relocated or moved away from hazard prone areas
Guide Questions	<ol style="list-style-type: none"> 1. Are there any hazard maps or environmental sensitivity maps developed for the area indicating potential disaster risks (natural and man-made)? Briefly describe who prepared the maps, year of preparation and coverage. Are these maps considered in the preparation of the emergency response plan? 2. How many people are living within the disaster risks zones? How many have been permanently relocated away from the hazard zones? 3. Is there any mechanism for the local government to permanently relocate those living in hazard zones? What is it?
Results	Coastal Inundation Maps are designed to predict potential flooding regions and the depth of flooding by considering flooding marks hit by typhoon, heavy rainfall and surge along with hydrological factors including demolition of dam, reservoir, and dike, and their over flow as well as design flood water level. The map is subdivided into Flood Inundation Risk Map and Coastal Inundation prediction Map which indicate potential flooding areas, an extent of damages, predicted depth of flooding by predicting potential damages from typhoon, heavy rainfall, and surge on the coastal areas.

• Results and Recommendation

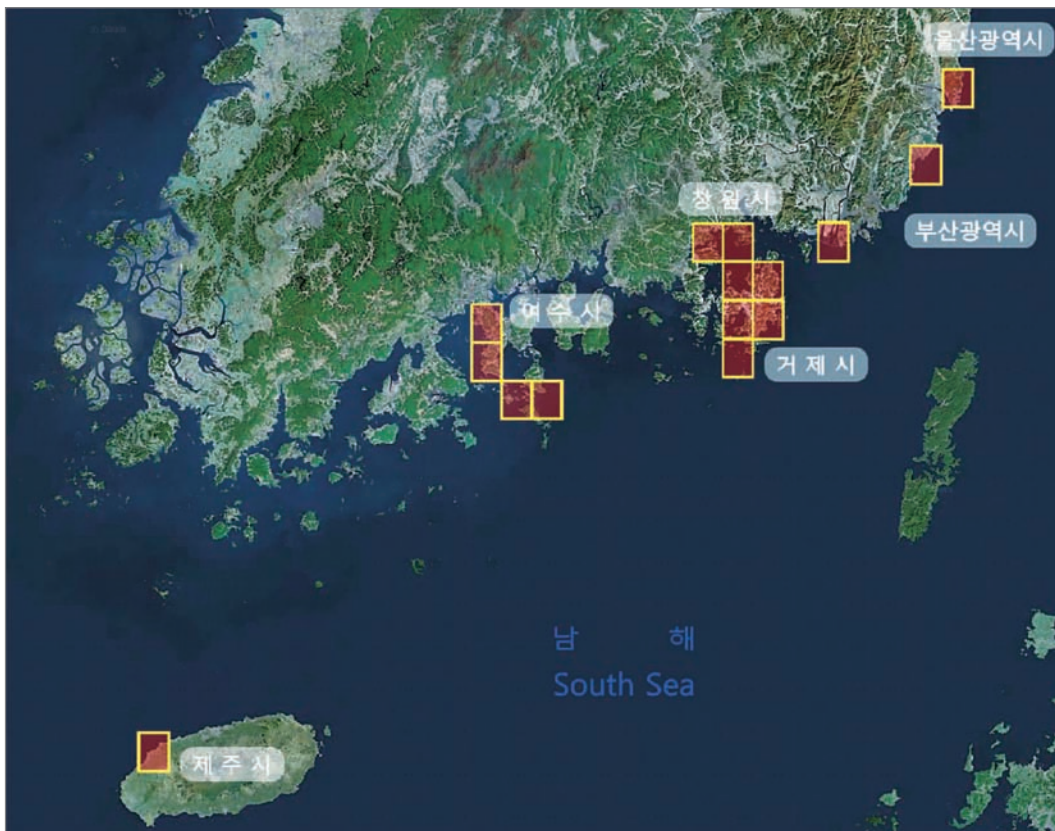


Figure 25. Areas vulnerable to flooding due to typhoon, heavy rain and tsunami

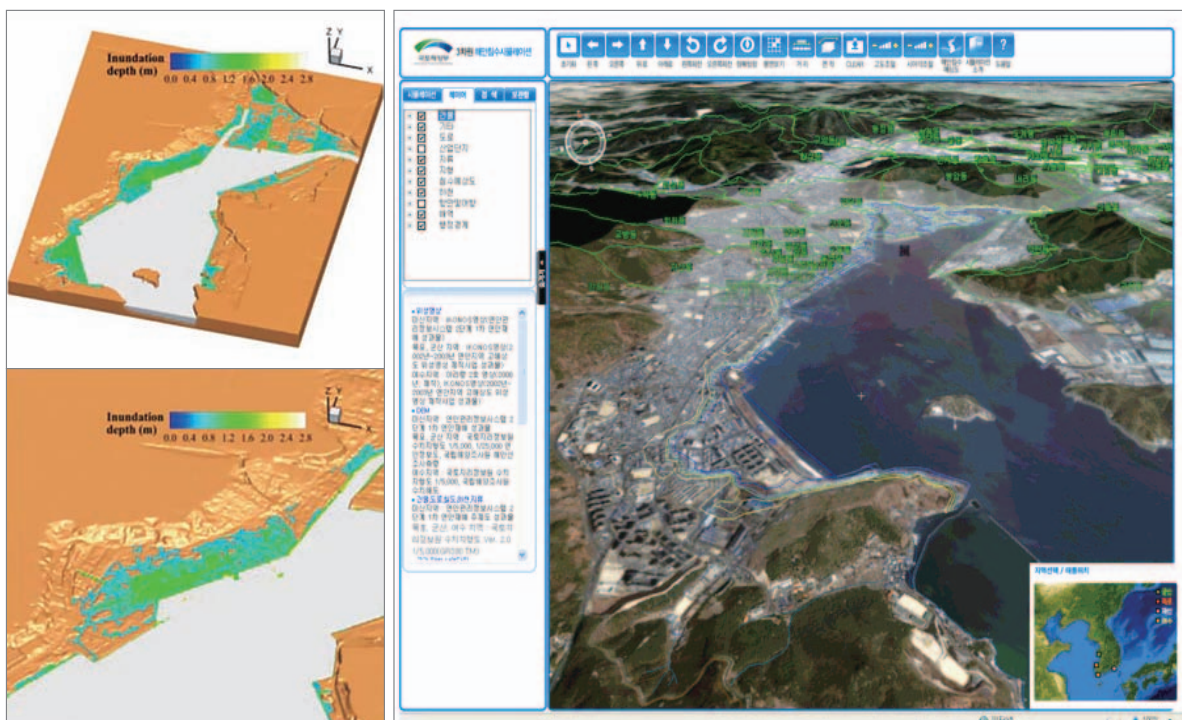




Figure 26. 3D map of submerged area in Changwon due to typhoon, heavy rain and tsunami (<http://www.coast.kr/CoastKnowledge/Use/CoastDisaster.aspx>)

SOC Code	Category	Indicator	State	Trend
017	Natural and man-made hazard prevention and management 환경 피해 예방 제도 및 관리 정책	Social and economic losses due to disasters 환경 재난에 따른 사회 경제적 피해 현황 조사 여부		

Description	This indicator measures the population affected, deaths and economic losses due to each type of disaster (including the severity of the cause of disaster). It is a measure that integrates: (a) the level and location of hazards vis-à-vis populations and (b) the level of preparedness and response mechanisms that result in the frequency and severity of actual disasters.
Rationale	Disasters set back development and especially impacts those least developed. The number of deaths, people and property affected are what hazard prevention and management ultimately aims to reduce.
Data requirements	<ul style="list-style-type: none"> • Frequency of disaster incidents by type • Number of people severely affected by natural/ man-made disaster incidents • Number of people that have died due to natural/man-made disaster incidents • Total amount of economic losses due to natural/man-made disaster incidents
Guide Questions	1. What changes/trends have occurred in the area, relative to the frequency and extent of disaster incidents by type (e.g., typhoons, floods, earthquakes, oil spill, harmful algal blooms, etc.), the number of people affected/died, and amount of economic losses due to natural/man-made disaster incidents?
Results	2003, Damaged property 180 million US\$ including flooding 33 buildings The frequency of disasters in low, however a few constructions are still going on the shoreline of the bay.

• Results and Recommendation

Maemi, the 14th typhoon of the 2003 season, occurred around Guam Island at 15:00 on 6 September and moved to Changwon area at about 20:00 on 12 September, causing heavy rainfall on land and tsunami damage to coastal areas. Central Disaster Relief Center reported a human death of 18.



Figure 27. Mimetic diagram of damaged area around Masan Bay due to super typhoon Maemi area



Figure 28. Local damages by of Masan Bay area typhoons

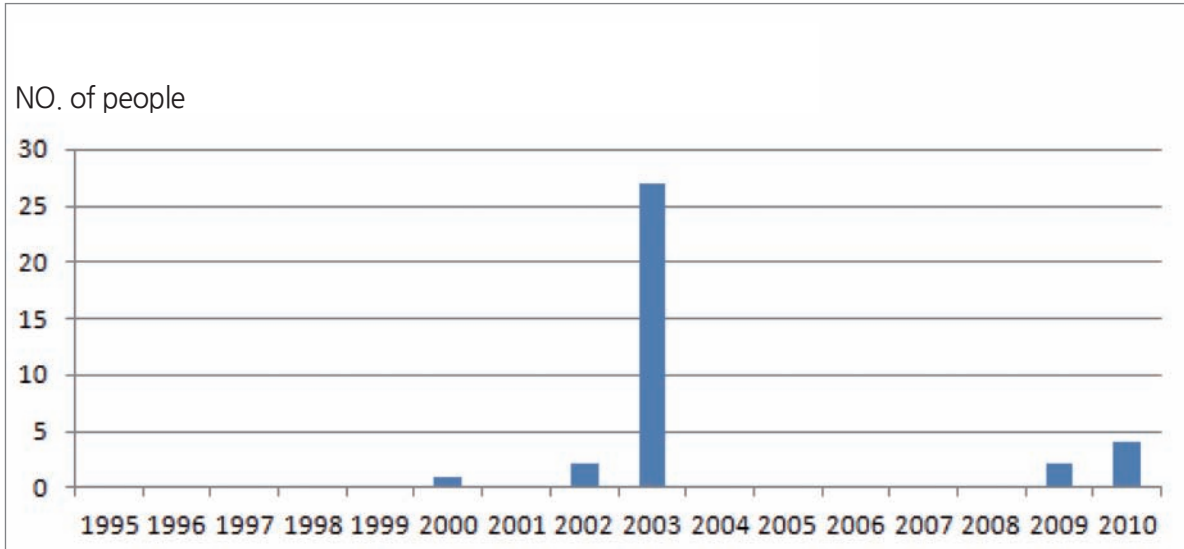


Figure 29. Number of people severely affected by natural disaster incidents (Number of people that have died due to natural)

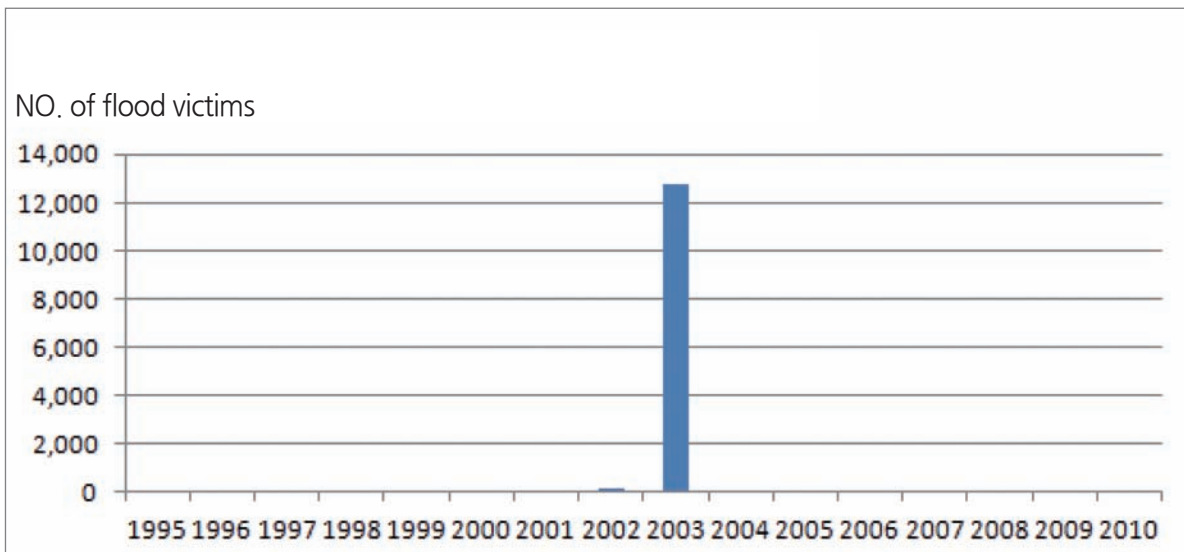


Figure 30. Number of flood victims by natural disaster incidents

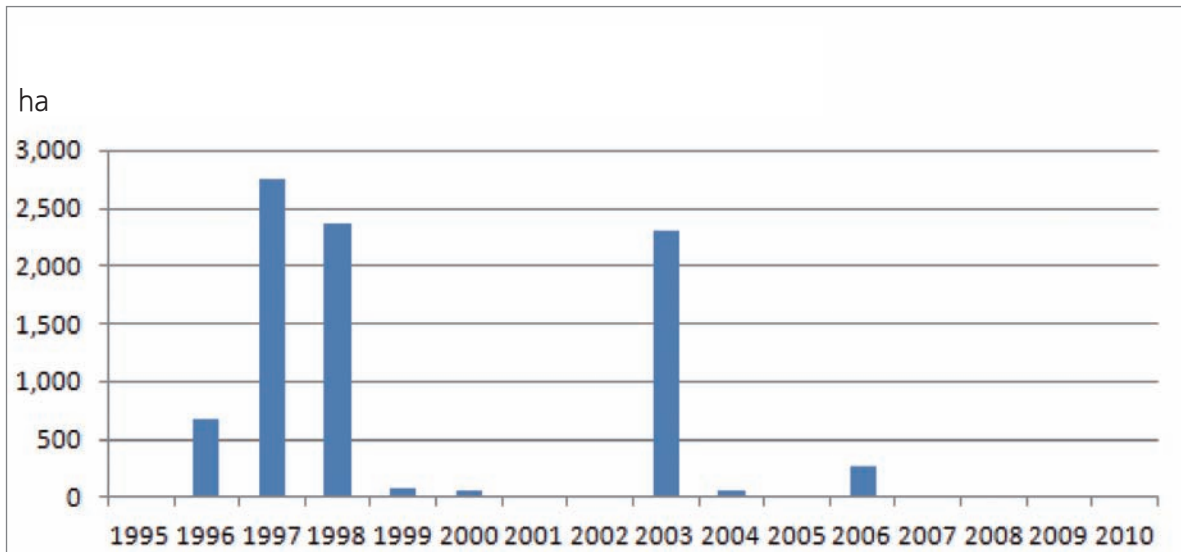


Figure 31. Flooding area by natural disaster incidents

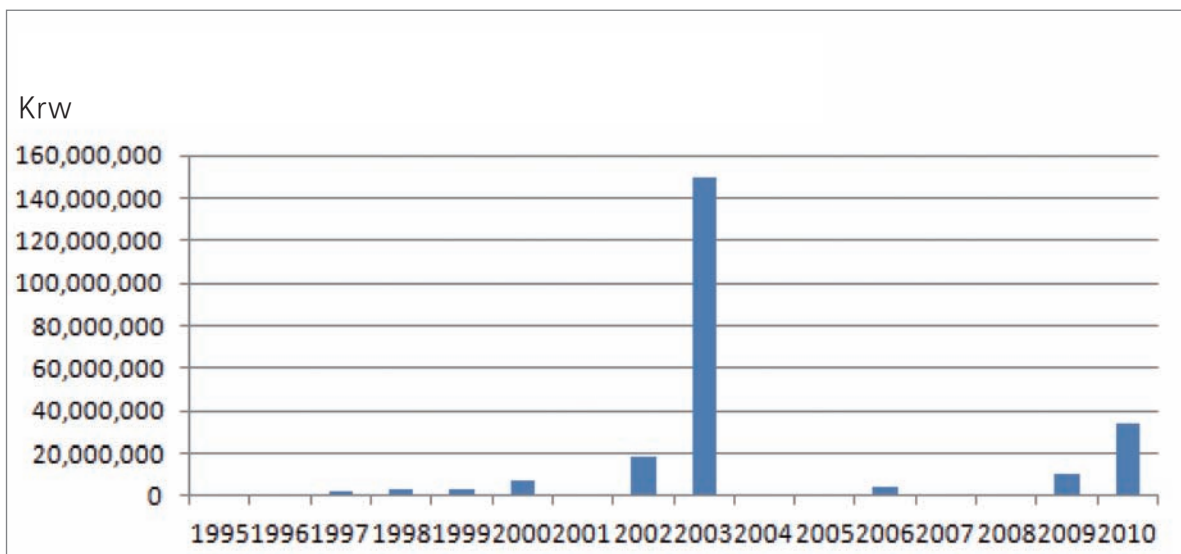




Figure 32. Financial damage caused by natural disaster incidents

SOC Code	Category	Indicator	State	Trend
018	Habitat protection, restoration and management 서식지 보호와 복원 및 관리	Habitat management plan and implementation 서식지 보호와 복원 및 관리 시행 계획 수립 여부		

Description	This indicator measures the availability of plans, people, and budget to manage coastal habitats and heritage.
Rationale	Coastal habitats serve as critical life-support systems for a multitude of aquatic living resources. The quality of these habitats must be maintained and improved to sustain their benefits. Local governments need to identify specific strategies and action plans for habitats and the means to implement these action plans indicate the degree to which habitats will be effectively managed.
Data requirements	<ul style="list-style-type: none"> • Availability of a habitat management plan • Staff and budget allocation for habitat management
Guide Questions	<ol style="list-style-type: none"> 1. Has a coastal habitat management plan been developed? When? What are its main features and scope, including the agency/ies responsible for implementation? 2. What is the local government's allocation of human (number of staff) and financial resources for habitat management, over time?
Results	2010. Fishery resources protection area in Changwon (20.235Km ²) 2011. Bongam mud flat was designated as wetland protection area

• Results and Recommendation

Fishery resources protection area refers to the water surface required to be shared or adjacent land selected for city management plans according to the Planning and Use of National Land Act by the Minister of Food, Agriculture, Forestry and Fisheries, mayor or governor in order to conserve and nurture fishery resources.

Fishery resources protection area, a type of means for the Planning and Use of National Land Act, is an amended form of fishery resources conservation zone designated based on the Use of National Land Management Act. Although the area is not considered natural environment conservation area, the shared water surface or adjacent land required could be designated as a fishery resources protection area to protect and nurture fishery resources.

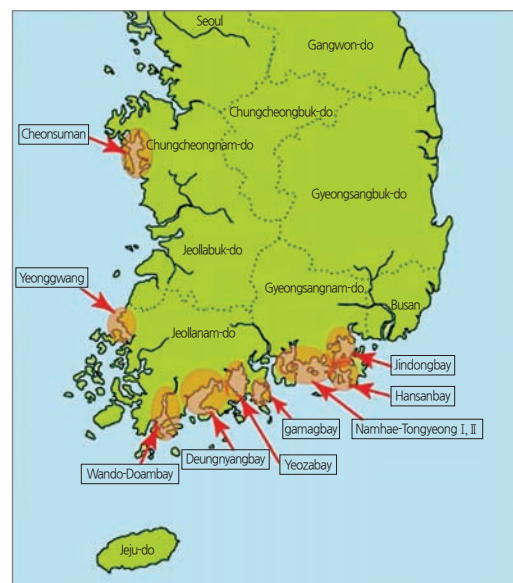


Figure 33. Habitat protection Area in Chnagwon

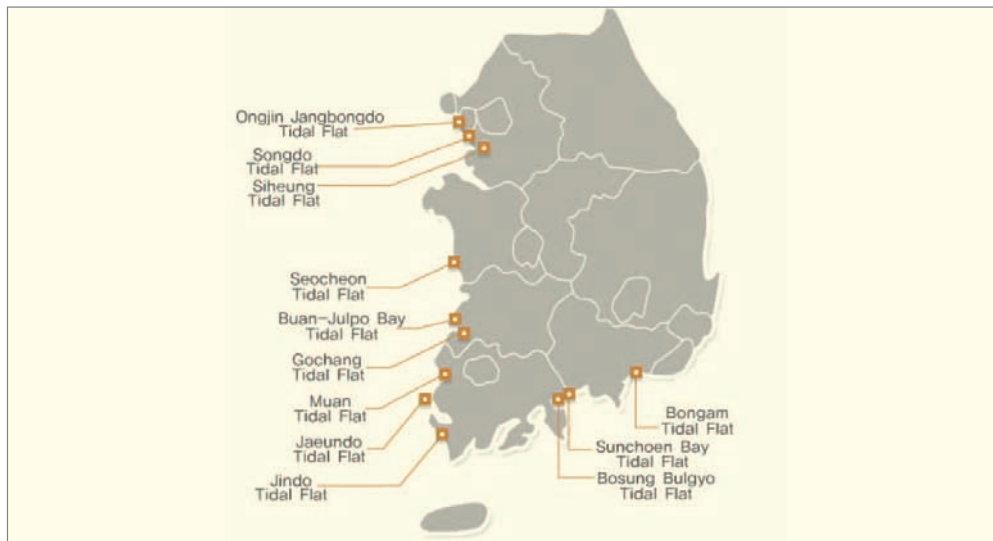


Figure 34. Wetland protection Area in Korea.

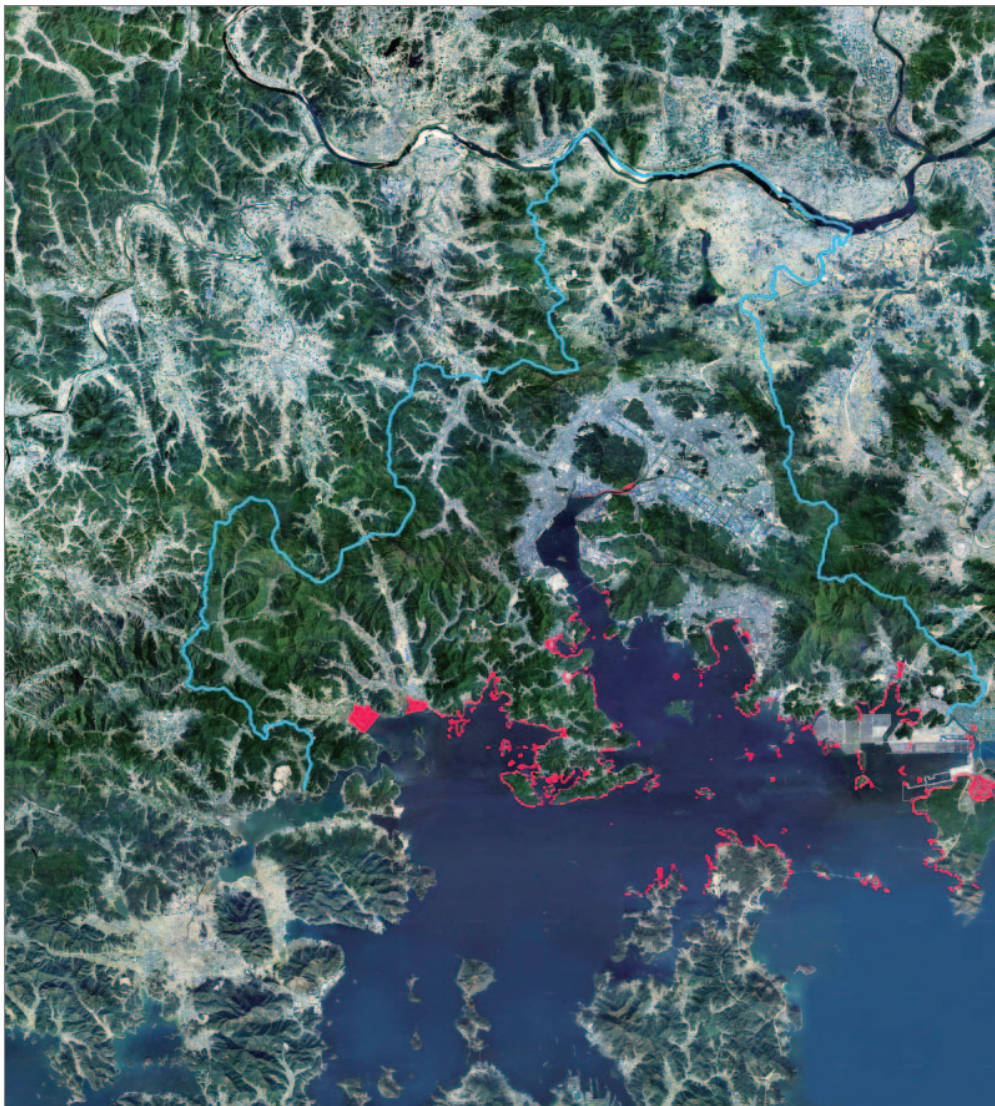




Figure 35. Tidel flat in Changwon.





Figure 36. Ecological map of Bongam mud flat around Masan Bay (designated as wetland protection area in 2011)

Bongam Tidal Flat in Changwon City is a rare tidal flat located close to downtown city. It is a representative example of ecosystem restored by cooperation of citizens after being damaged by industrial pollution in 1970s and 1980s. For the last decade, Bongam Tidal Flat has been used as ecological education, and it was designated as a Wetland Protection Area in December 2011.

SOC Code	Category	Indicator	State	Trend
019	Habitat protection, restoration and management 서식지 보호와 복원 및 관리	Areal extent of habitats 서식지 면적의 크기		

Description	This indicator measures the area of various natural habitats (coral reefs, seagrass beds, mangrove forests, beaches, forests, urban green areas).
Rationale	Natural habitats and associated species help sustain products and services that support and benefit human activities. The extent and condition of various habitats also indicate the populations of associated species.
Data requirements	• Total area (km ²) of coastal habitats (coral reef, seagrass, mangrove, natural beach, forest (excluding mangroves), and urban "green" area)
Guide Questions	1. Are there any significant changes in the area of natural habitats (coral reefs, seagrass beds, mangrove forests, beaches, forests, urban green areas) over time? What changes/trends have occurred in terms of area coverage and quality of habitats?
Results	2011. Bongam mud flat was designated as wetland protection area This area will be extended as a Ramsar Site in near future.

• Results and Recommendation

The urban (Bongam) tidal flat is located at an estuary of Masan Bay and in the front of several factories at the entrance of the free trade zone. This tidal flat under reclamation pressure was neglected as a small piece of tidal flat considered to be useless. However, it was protected by the suggestion from NGO and acceptance from GO in 1999. Restoration efforts were given to the Bongam tidal flat since then. To raise the public awareness of the importance of the ecosystem, this tidal flat was assigned as an official visit site during the COP10 Ramsar Convention in 2008. The Community Advisory Council established as eco-tour program which provides citizens an opportunity to witness the restoration of the ecosystem and the mudflat service.

According to the Wetlands Conservation Act (Article 8, Section 1, Clause 2) and Coastal Wetlands Protection Area Road Map (Ministry of Land, Transport and Maritime Affairs order no. 285, 29 June 2009), the Korean government designated Bongam mud flat as wetland protection area after confirming that 37 species of macrozoobenthos, government-designated endangered species red feet crabs, natural monument kestrel and four endangered species (level 2) including osprey, buteo buteo, long billed plover and larus saundersi inhabited the area.





Figure 37. Urban (Masan Bongam) Tidal Flat in Masan Bay

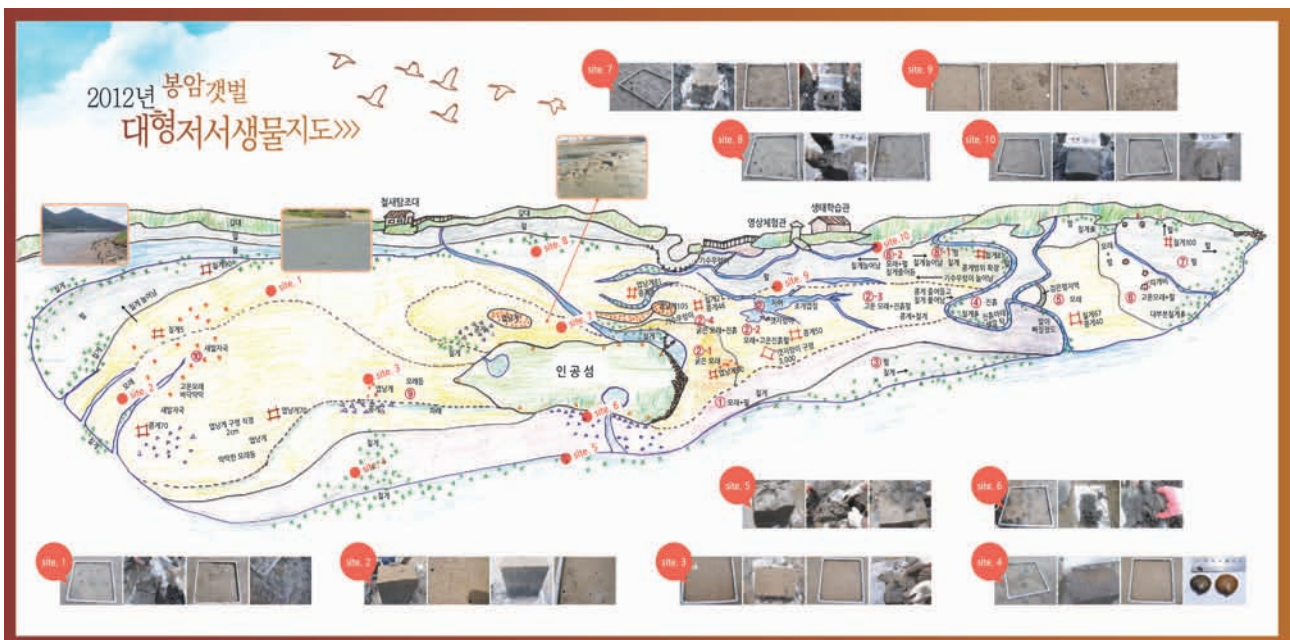




Figure 38. Citizen Science monitoring in Masan Bay(Masan Bongam Tidal Flat)

SOC Code	Category	Indicator	State	Trend
020	Habitat protection, restoration and management	Protected areas for coastal habitats and heritage 해양 서식처와 보호구역 설정 여부		
Description	This indicator measures the area of coastal habitats and heritage effectively protected from degradation, as well as the extent of rehabilitation.			
Rationale	The protection of coastal habitats and heritage reflects the commitment of local governments to prevent habitat loss and degradation. The protection of these habitats helps sustain the environmental, social and economic benefits derived from them.			
Data requirements	<ul style="list-style-type: none"> • Number and area of terrestrial, marine and coastal heritage areas protected by law • Management effectiveness rating of terrestrial, marine and coastal heritage protected areas • Natural areas rehabilitated (km²) 			
Guide Questions	<ol style="list-style-type: none"> 1. Has there been an increase in efforts to protect coastal habitats, resources, and heritage (e.g., establishment of protected areas)? What are the changes, in terms of number and areal extent of established/proclaimed protected areas? 2. Is there a mechanism to assess the effectiveness/benefits derived from protected areas? What are the principal results? 3. What is the extent of efforts to rehabilitate natural areas? Have efforts been made to monitor and evaluate ecological improvements/trends in these areas? What are the main results? 			
Results	<p>After rapid industrialization, Bongam mud flat had been a dead land to local residents. Although efforts were made to reclaim Bongam mud flat to build factories along with the rapid industrialization, Masan Regional Maritime Affairs and Port Office and civic groups tried to avoid reclamation and instead establish ecological learning site for wise use and conservation of the wetland. Their effort resulted in the ecological learning site with an ecological learning center, bird watching station, artificial island and wooden bridge and the wetland became a valuable asset and habitate to citizens and migratory birds. It also held significant meaning in that it showed promise for Masan Bay restoration.</p> <p>Thanks to such effort and attention in the region, currently Bongam mud flat is a vital habitat for various animals and plants including reeds, salt plants, migratory birds, crabs, lugworms which have been rarely seen in the area, serving as a valuable place where people can relax and learn the importance of life and environment in city areas.</p> <p>It was designated as a protected wetland area in 2011 and is being promoted to be registered as a Ramsar site.</p>			



• Results and Recommendation

Bongam mud flat conservation activities

Bongam mud flat conservation activities

- 1996 Wastewater discharge from Changwon National Industrial Complex happened in 1996. It followed tidal flat conservation activities and ecological education in Bongam mud flat.
- 1997 Celebration of Ocean Day: Bongam Stream Wetland Tour
- 1998 Annual Bongam Wetland Ecological Tour (city ecological tour)
- 1999 Bongam mud flat reclamation response activities application for shared water surface reclamation of Bongam mud flat rejected Public-private meeting to establish an ecological learning field on Bongam mud flat
- 2000 Celebration of Wetlands Day: Bongam Mud Flat Ecological Tour and Clean-up Activities
- 2001 Environmental ceremony Maehyangjae for restoration of Bongam mud flat
Planting of sweetbrier Korea-Japan joint wetlands survey, Opening of Bongam mud flat ecological learning field
- 2002 Planting of sweetbrier
First vegetation survey on Bongam mud flat artificial island
Establishment of artificial wetland around Bongam mud flat
- 2003 Planting of tea plant and gardenia
Second vegetation survey on Bongam mud flat artificial island
- 2004 Regular survey on shorebirds
Planting of sweetbrier and gardenia
Integrated education at Masan Middle School (continued)
- 2005 Regular survey on shorebirds
Planting of thornbush
- 2006 Opening of education center and underground observatory
Ramsar Convention for future generation
- 2007 Ecological education on Bongam mud flat
- 2008 Official visit site for the 10th Ramsar Convention
Starting work with contractors for effective use and management of Bongam mud flat ecological learning field
- 2009 Citizen science monitoring project for Bongam mud flat
Designated as well-developed natural and cultural heritage by Korea National Trust
- 2010 Starting of national marine litter monitoring project on Bongam mud flat
- 2011 Designated as National Wetland Protection Area
- 2012 Being promoted to be registered as Ramsar Wetland

Table 15. Number of visitors to Bongam mud flat and its maintenance expenses

Year	No. of visitors	Subcontractor fee	Monitoring expenses
2008 (August-December)	5,892	4,800,000	
2009	10,917	9,000,000	10,695,690
2010	15,680	14,400,000	13,517,220
2011	16,609	15,249,920	14,129,160

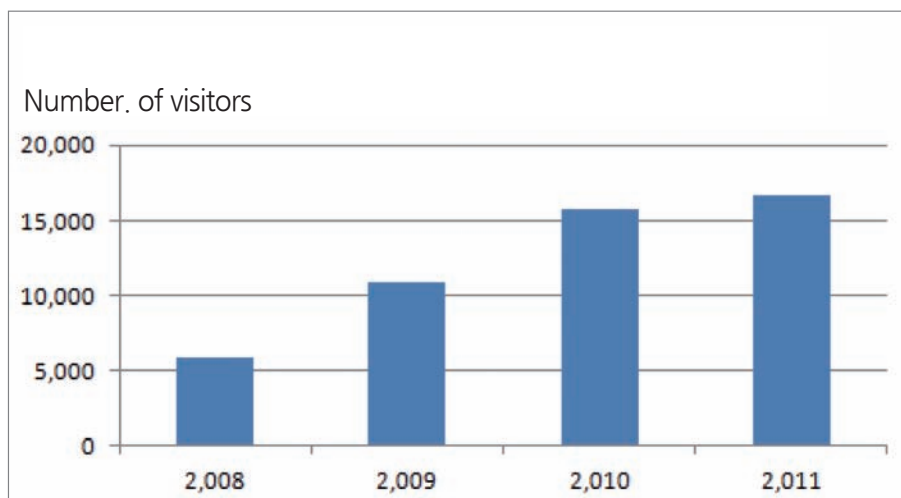


Figure 39. Changes in the number of visitors to Bongam mud flat

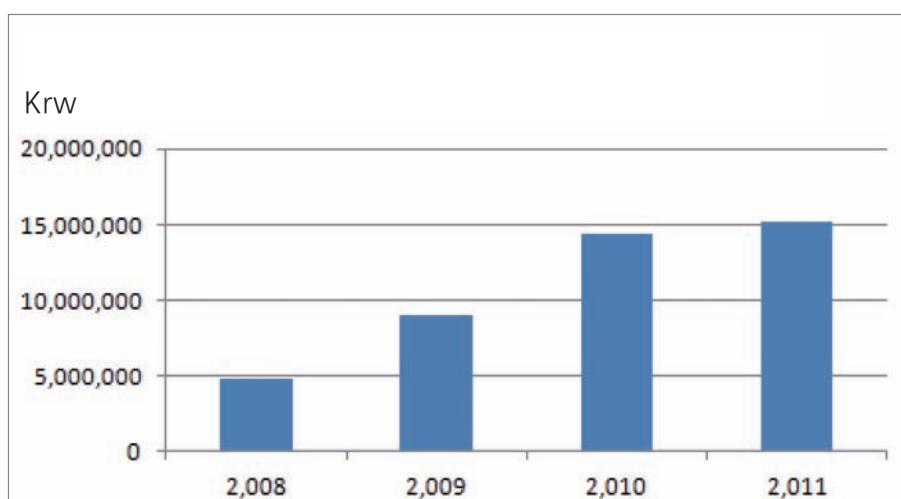


Figure 40. Bongam mud flat maintenance expenses

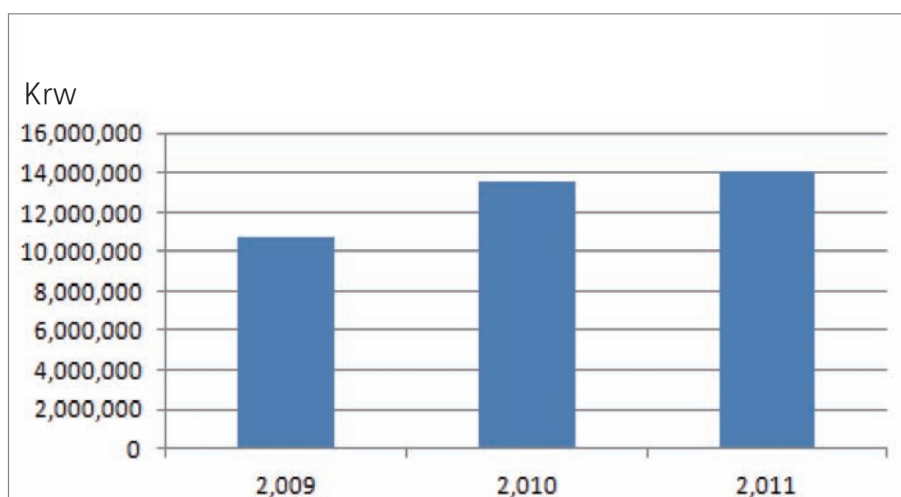




Figure 41. Bongam mud flat monitoring expenses

SOC Code	Category	Indicator	State	Trend
021	Habitat protection, restoration and management	Reclamation and conversion 매립과 용도변경		

Description	This indicator measures the area of coastal habitat that has been converted for other uses (e.g., mangrove to fishpond). This also includes the extent of reclamation in the coastal areas.
Rationale	The costs (limited access for some sectors, stability and safety of those using structures built on reclaimed land, destruction of mangrove nursery grounds of marine life, loss of fisheries fry gathering grounds, erosion, etc.), benefits (ports that would benefit society, etc.) and the sectors that would be affected should be considered before reclamation or land conversion is authorized.
Data requirements	<ul style="list-style-type: none"> Total length of coastline and area reclaimed Total coastal area converted to other uses (e.g. mangrove to fishpond)
Guide Questions	<ol style="list-style-type: none"> Are there any significant changes in the area covered by mangroves, corals, seagrass, etc. resulting from reclamation and conversion activities? What are they? Is coastal reclamation/conversion activities covered by existing laws? How effective are the laws in controlling/reducing illegal activities in the coastal area? Is the mechanism sufficient or effectively implemented?
Results	<p>To secure lands for industrial complexes, the government set out large scale reclamation projects around Masan Bay area in 1960s. At that time, there were no environmental impact assessment policies or regulations. Thus, these developments and reclamations were conducted without considering environmental capacity of the Bay, which affect the water quality significantly.</p> <p>Accordingly, the sea area in the Masan Bay reduced from 19.5 Km² in 1964 to 14.3 km² in 1998.</p>

• Results and Recommendation

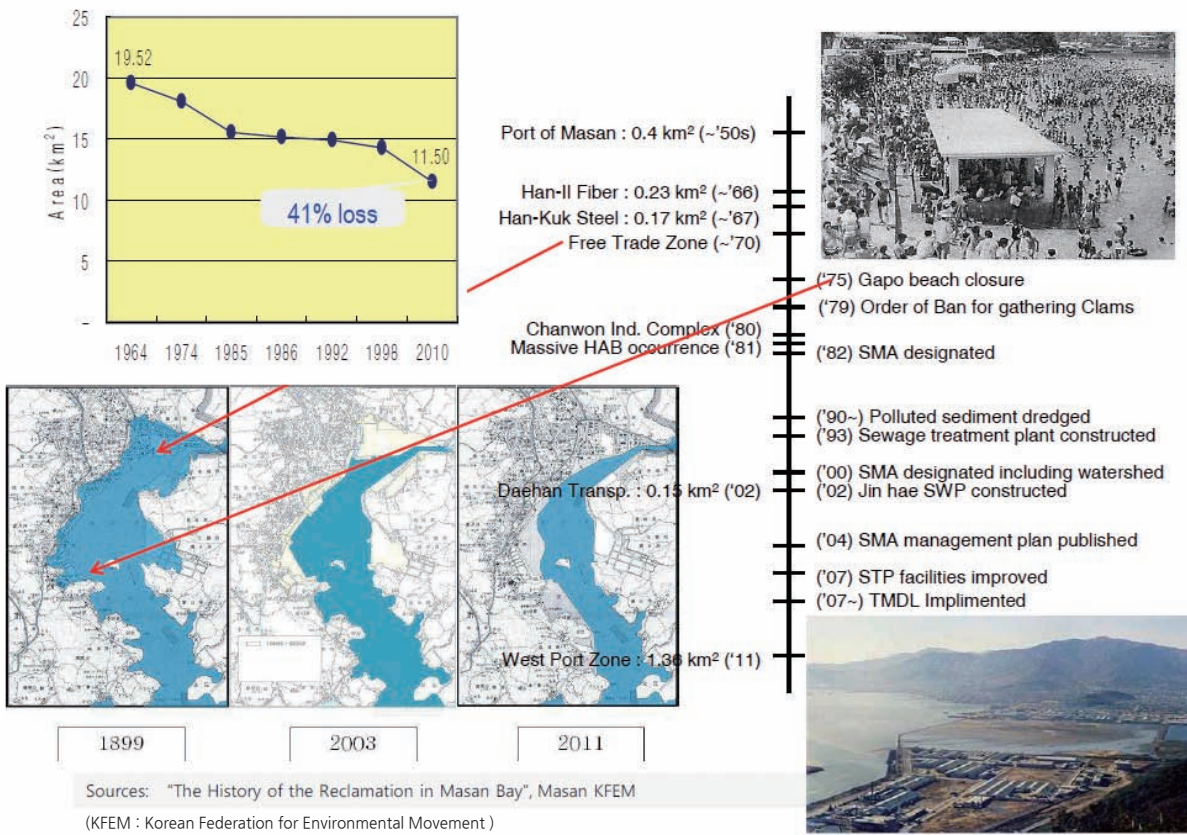




Figure 42. Reclamation of Masan Bay



SOC Code	Category	Indicator	State	Trend
022	Water use and supply management 물 사용과 공급 관리	Water conservation and management 물 보호와 관리		

Description	This indicator measures the demand of the population for freshwater and accounts the intensity of freshwater management efforts through availability of water management and conservation plans, strategies adopted, and staff and budget allocated.
Rationale	Freshwater is essential for life and effective management for its sustainable use is of utmost importance for a healthy community.
Data requirements	<ul style="list-style-type: none"> • Availability of water management and conservation plan • Mitigation and adaptation strategies identified • Water use per capita • Staff and budget for water management
Guide Questions	<ol style="list-style-type: none"> 1. Has an assessment of freshwater sources been conducted? What is the projected level of availability over time? How are demands changing over time? 2. Has a water management and conservation plan been developed? What is the scope of the plan? What is the implementing mechanism for the plan? What are the staff and budget allocations for water management in the local government? 3. What is the local government's strategy/ies in terms of water management and conservation?
Results	Water supply rate in Changwon City as of 2011 was 97.5% and in order to secure water supply sources, 80,000m ³ of bank-filtered water is supplied per day through water treatment facilities. This will be expanded to 140,000m ³ per day to supply more bank-filtered water to the public.

• Results and Recommendation

Table 16. Water supply information of Changwon City

Administrative district (City/ County)		Total population	Water-supply population	Supply rate(%)	Facility capacity (m ³ /day)	Supply volume (m ³ /day)	Per capita supply volume /day (L)	급수 전수 (계)
1998	Changwon City	506,330	421,313	83.2	20,500	117,930	280	19,090
	Masan City	435,343	398,468	91.5	401,250	179,726	451	40,605
	Jinhae City	134,114	125,824	93.8	74,500	33,974	270	15,139
2009	Changwon City	508,984	483,910	95.1	151,807	120,955	250	25,725
	Masan City	409,776	392,855	95.9	400,000	154,660	394	41,754
	Jinhae City	173,911	171,573	98.7	76,748	49,512	289	17,616
2010	Changwon integrated	1,103,849	1,075,809	97.5	550,000	327,044	304	87,657



Figure 43. Air view of riverbank filtration development site



Public water pollution reporting contest was held.

Changwon City established full time monitoring system (24 hours water quality monitoring system) and emergency communication network among departments and ensured that monitoring specialists to work onsite for effective water quality control.

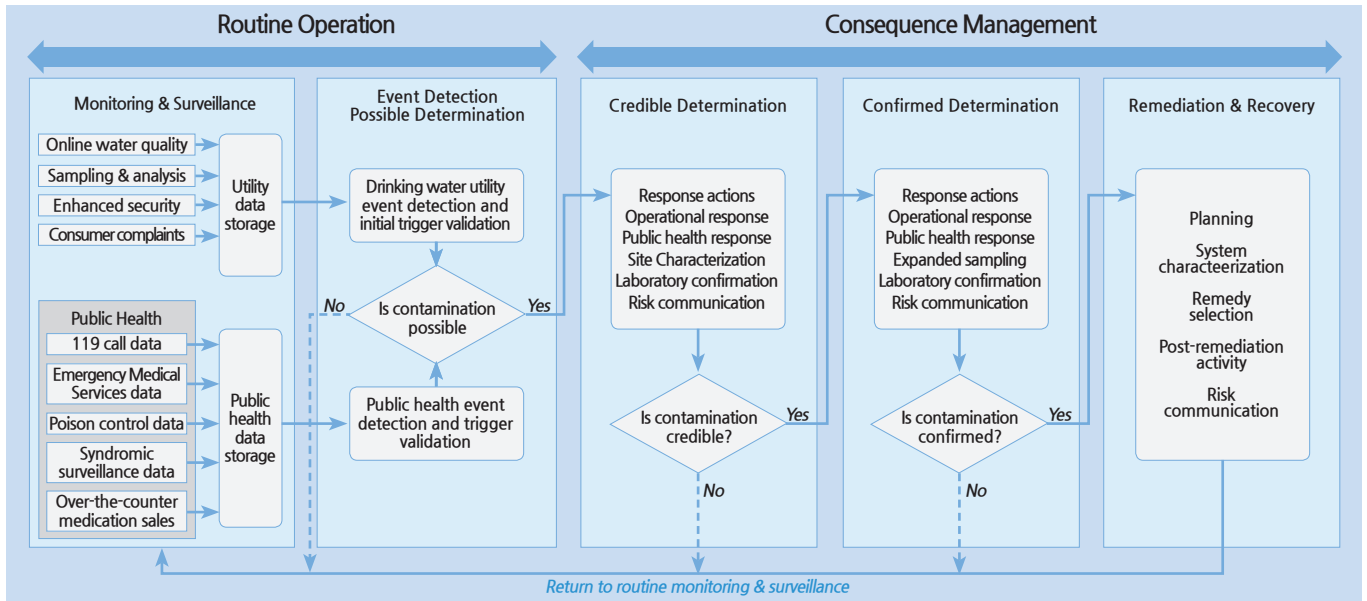


Figure 44. Full Time Monitoring (24 hours water quality monitoring system)



Operation of city water service center

수돗물에 이상이 있으신가요?

아래 연락처로 전화주시면 궁금증을 바로 처리해 드리겠습니다.
상수도 민원안내 1577-0142

수돗물 수질 이상 시(이물질, 적수 등) : 구마산권(225-6361), 구창원권(225-6374), 구진해권(225-6381)
 수도요금정보 : 구마산권(225-6211), 구창원권(225-6221), 구진해권(225-6231)
 급수상담 : 구마산권(225-6276), 구창원권(225-6273), 구진해권(225-6275)

Figure 45. City water service center promotion material

SOC Code	Category	Indicator	State	Trend
023	Water use and supply management	Access to improved water source 수자원의 확보 전략		

Description	This indicator estimates the population with access to an improved water source, the amount delivered and the price paid by households for water supply.
Rationale	Freshwater resources whether scarce or abundant may not necessarily be accessible or equitably accessible. Difficulty of access including high prices disproportionately burdens those with less resources especially more vulnerable individuals and households within communities.
Data requirements	<ul style="list-style-type: none"> • Population using improved water sources • Volume produced from piped water sources • Water pricing per cubic meter
Guide Questions	<ol style="list-style-type: none"> 1. Are there any significant changes in the number of people having access to improved water sources? What are the changes? 2. How much water is produced from piped water sources? What is the extent to which piped water sources can meet the demand from the community in the future? 3. What are the strategy/ies and program/s for ensuring access to safe potable water to the community, including the poor?
Results	<p>Ground water usage/development availability rate in Changwon reaches almost the maximum level at 99.9%, significantly higher than that of Gyeongnam at 34%. High road paving rates also prevent penetration of rainwater into the ground, thus, establishing a reservoir and securing sufficient water are difficult. In this sense, Changwon City has tried to identify water cycle improvement measures utilizing rainwater in order to secure sufficient water resources. Rainwater is the most energy saving, eco-friendly water resource which may be used for a wide range of purposes and its quality is comparable to that of surface water. Several regions conducted rainwater experiments to conserve water resources and ordinances for use of rainwater was established in 2009. Changwon developed major city streams into ecological streams and restored rivers in the city for fish and Changwon citizens, serving as a cradle of national industrial complex, Changwon City promotes effective use of rainwater and in order to prevent flooding and establish a sustainable ecological city, it established and implemented ordinances regarding use of rainwater in 2011.</p>





Figure 46. Changwon YMCA rainwater bank (Rainwater saving facility)

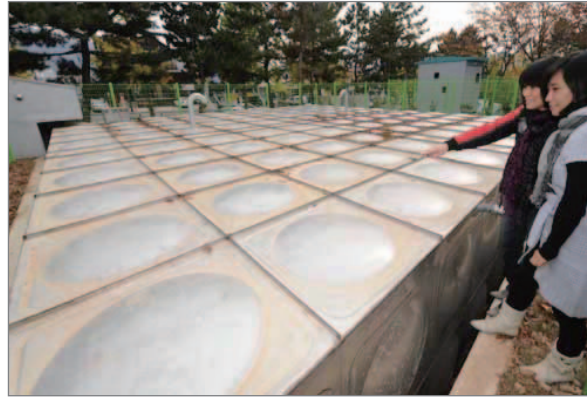


Figure 47. Rainwater facilities in Yongji Cultural Park, Shinwoeldong, Changwon



Figure 48. Nam Stream restored for effective water resources management

Table 17. Ordinances for rainwater management in Changwon

Ordinances for rainwater management in Changwon

(Established:) 1 July 2010 Ordinance No. 126
(Revised by Changwon Administrative Agency) 20 January 2011 Ordinance No. 403

Chapter 1 General Provisions

Article 1. (Purpose) This ordinance specifies requirements for comprehensive and systematic implementation of rainwater management policies in Changwon with an aim to promote effective use of rainwater, prevent flooding and establish a sustainable ecological city.

Article 2. (Definition) In this ordinance the following terms shall have the following meanings:

① “Rainwater management facilities” refers to facilities utilizing and managing rainwater on building roof, roads and other impervious surface and includes the following facilities:



1. Rainwater utilization facilities collect rainwater and utilize according to purpose of rainwater.
 2. Rainwater storage-infiltration facilities retain or infiltrate rainwater to underground in order to prevent non-point source pollution or flooding caused by rainwater discharging on the surface.
- ② “Large-scale development plan (including building construction plan)” refers to district development plan based on the Planning and Use of National Land Act, housing site development project based on the Housing Site Development Promotion Act, city development project based on the City Development Act, residential environment improvement project, housing redevelopment project and housing reconstruction project based on the City and Residential Environment Improvement Act and apartment construction project and land development project based on the Housing Act.

Article 3. (Establishment of basic plans for rainwater management) ① Changwon City Mayor(hereafter “Mayor”) shall establish Changwon City Rainwater Management Basic Plan (hereafter “Basic Plan”) to comprehensively and systematically implement rainwater management policies in Changwon City.

- ② Rainwater Management Basic Plan shall include the followings:
1. Basic direction and strategies of rainwater management policies
 2. Major policy measures and improvement measures of rainwater management policies
 3. Establishment and management of rainwater management facilities
 4. Cost calculation required for rainwater management projects and funding plans
 5. Other information required for effective implementation of rainwater management policies
- ③ Mayor may conduct a regional and seasonal precipitation survey and an investigation (including water cycle, heat cycle, energy consumption, etc.) required for city rainwater management around the surrounding areas.

Article 4. (Cooperation with other organizations and agencies) Mayor may request public organizations, corporations or groups in Changwon City for cooperation to effectively implement rainwater management policies.

Article 5. (Implementation of rainwater utilization measures) ① Mayor may promote necessary measures required to prevent flooding, improve public waters quality and maintain adequate water volume in streams during dry seasons by controlling rainwater flow during rainy seasons.

- ② Mayor may predict rainwater usage for residential, industrial and landscaping work purposes and promote measures to gradually increase rainwater usage.

Chapter 2. Rainwater Utilization Facilities

Article 6. (Recommendations on installation of rainwater utilization facilities)

- ① Mayor may recommend facilities or building owners or managers to install rainwater utilization facilities. The applicable facilities and buildings are as follows:
1. Public facilities and school buildings under Changwon municipal government of which roof area is 1,000 m² or bigger;
 2. Apartment complex with 200 households or more, which is constructed

- under large-scale development plan specified in the Article 2 (2);
3. Building of which land area is 2,000 m² or bigger and total ground area is 3,000m² or bigger; and
 4. Other facilities or buildings selected by Mayor for effective implementation of rainwater utilization measures.

② Notwithstanding a provision included in Section 1, rainwater utilization facilities installed on sports field or stadium set out in Appendix 1 of the Enforcement Ordinance on Installation and Use of Sport Facilities shall be based on the Article 16 of Waterworks Act and Article 26 of Enforcement Ordinance on Waterworks Act.

Article 7. (Registration of installation of rainwater utilization facilities) ① A person who wants to install rainwater utilization facilities according to Article 6 should submit an application for the building or facilities and the following documents and drawings to Mayor:

1. Installation plan of rainwater utilization facilities (Appendix 1)
2. Rainwater utilization facilities project overview indicating facilities location, capacity, project budget and project period (Appendix 2)
3. Blueprint and floor plan related to rainwater utilization facilities
4. Documents proving the calculated capacity of rainwater utilization facilities

② As for the submitted documents and drawings set out in Section 1, Mayor shall review installation status of the buildings and facilities and issue a letter of permission (Appendix 3) to install rainwater utilization facilities if the design criteria are considered appropriate.

③ The person who is given a letter of permission to install rainwater utilization facilities shall inform Mayor if any of the following cases occurs:

1. Expansion of rainwater utilization facilities
2. Shutdown of rainwater utilization facilities
3. Change of registered office
4. Any change related to rainwater utilization facilities

④ Facilities establisher or manager who wants to install rainwater utilization facilities in the existing building shall follow the provisions specified in Section 1, 2 and 3.

Article 8. (Rainwater utilization facilities criteria) ① Rainwater utilization facilities shall include the following facilities:

1. Collection facilities to collect rainwater on roofs
2. Treatment facilities such as rain separator to exclude rainwater poured at the beginning of rain or filters to eliminate foreign substances in rainwater
3. Rainwater retaining facilities storing the rainwater processed through treatment facilities should fulfill the following requirements:
 - A. Capacity should be bigger than (roof area (m²) x 0.05m)
 - B. Facilities should be designed to prevent water evaporation or foreign material contamination and block sunlight
 - C. Facilities should be designed convenient for internal cleaning
4. Distribution and drainage channels including pumps, distribution pipes and drainage pipes to convey the processed rainwater to rainwater use facilities

Article 9. (Management of rainwater utilization facilities) ① Rainwater utilization facilities manager (hereafter“manager”) shall be the owner or actual supervisor of the buildings or facilities in which rainwater utilization facilities are installed.

② Manager shall follow the below guidelines for rainwater utilization facilities management:

1. Water distribution and drainage channels shall be distinguished from water supply and gas distribution pipes.
2. In order to prevent improper use of the facilities, all rainwater utilization facilities should be labelled Rainwater Use Facilities.
3. Rainwater usage and any leakage shall be monitored and managed to ensure optimal operation of the facilities.
4. All facilities specified in the Article 8 (1) shall be inspected regularly at least twice a year and cleaned to remove any foreign substances.

Chapter 3. Rainwater Storage and Infiltration Facilities

Article 10. (Recommendations on installation of rainwater storage and infiltration facilities) ① Mayor may recommend to install rainwater storage and infiltration facilities to developers, facilities or building establishers and supervisors if any of the followings is applicable:

1. Infrastructure based on Article 2 (6) of the Planning and Use of National Land Act
2. Facilities subject to Prior Environment Review System according to Article 25 of the Framework Act on Environmental Policy
3. Facilities subject to environmental effects evaluation according to Article 3 (1) of the Ordinances for Gyeongnam Environmental Effects Evaluation
4. Any building of which land area is 2,000 m² or bigger or total floor area is 3,000m² or bigger
5. Other development projects, facilities or buildings selected by Mayor for effective implementation of rainwater utilization measures

② Buildings or facilities in which rainfall-runoff reduction facilities based on Article 19 of the Countermeasures against Natural Disasters Act and non-point pollutant prevention facilities based on Article 53 of the Water Quality and Ecosystem Conservation Act are properly installed according to the Article 11 (1) shall be deemed to have installed rainwater storage and infiltration facilities.

Article 11. (Installation of rainwater storage and infiltration facilities and facilities standards) ① Criteria for rainwater storage and infiltration facilities type, size, structure, installation and maintenance shall be set based on conditions in each region.

② Mayor may inspect rainwater storage and infiltration facilities annually and provide recommendations to facilities operators to implement necessary measures.

Chapter 4. Funding Support for Installation and Use of Rainwater Management Facilities

Article 12. (Funding support) ① As for a person or entity who is planning to newly build rainwater management facilities, Mayor may, within the budget, support fund for the whole or part of its expenses.

② According to the provision stated in Section 1, Mayor may redeem the whole or part of its support fund if any of the following cases apply to the recipient:

1. The recipient received support fund through false pretense or any dishonest means
2. The recipient stopped operation of rainwater management facilities without any reasonable cause



3. The recipient failed to implement improvement measures for rainwater management facilities

Article 13. (Water rate reduction) ① The owner or manager of buildings or facilities who has a letter of permission to install rainwater utilization facilities based on the Article 7 may submit an application for water rate reduction (Appendix 4) for the relevant rainwater utilization facilities installed in the buildings or facilities.

② As for water supply bill charged on the rainwater utilization facilities, reduction benefit may be granted for rainwater usage and will be reflected in the water supply bill of the same period.

③ Rainwater usage measured according to the Measurement Act shall be applied and monthly rainwater usage shall be used.

④ According to the provision set out in Section 2, water supply bill and reduction benefits shall be calculated based on the supplied water amount and rainwater usage measured by water meter during the same period.

⑤ Mayor shall set a specific date for every month to measure the supplied water amount and rainwater usage and calculate the reduction amount based on the measurement, in order to reflect reduction benefit on water bill statement.

⑥ According to the provision specified in Section 2, small-scale facilities not included in the list of recommended facilities may receive reduction benefit if rainwater utilization facilities are installed and used.

⑦ All other matters regarding rainwater utilization facilities measurement and water bill reduction relevant to this ordinance will refer to the Ordinances for Changwon Water Supply.

Chapter 5. Establishment and Operation of Rainwater Management Committee

Article 14. (Establishment of Rainwater Management Committee) Changwon City Rainwater Management Committee (hereafter “Committee”) shall be established and operated under Changwon Municipal Government in order to deliberate the following matters regarding implementation of rainwater management policies:

1. Establishment and implementation of the basic plan;
2. Installation criteria of rainwater management facilities;
3. Review and assessment of rainwater management measures; and
4. Any other matters considered important by Mayor for effective implementation of rainwater management measures

Article 15. (Formation of Rainwater Management Committee) ① The number of committee members will be limited to 15 including the Head of Committee.

② The Head of Committee will be the senior deputy mayor and officials members will include the Head of Environmental Greenbelt, City Policy, Construction and Transportation, Office of Waterworks, Office of Sewage Treatment Plant and Office of City Development. Commissioned members will be appointed by Mayor among the following persons: (Revised on 20 January 2011)

1. Members of Changwon Council
2. A person with in-depth knowledge and experience in water quality, water resources and rainwater management or city development and architecture, etc.

③ The tenure of commissioned member is 2 years and may be re-appointed for a second term only.



Article 16. (Duties of Head of Committee) ① The Head of Committee represents the Committee and manages overall work of the Committee.

② In case that the Head cannot serve his/her role owing to unavoidable circumstances, the member pre-appointed by the Head may act as a proxy.

Article 17. (Rainwater Management Committee Meeting) ① The Committee meeting will be held upon a request of one third or more members of the Committee or the Head as he/she recognizes the need to call a meeting.

② In the Committee meeting, decisions can only be made when more than half of the Committee members attended the meeting and agreed to such decision.

Article 18. (Monetary benefit) Monetary benefits and travel expenses may be provided to the Committee members who attended the Committee meeting according to the Ordinance for travel expenses reimbursement for Changwon Committee, however, reimbursement will be limited to the Committee's budget and may not be made for the public officials who attended the meeting for his/her direct duties.

Article 19. (Detailed rules for Operation of Committee) Decisions regarding the Committee meeting and operation shall be made by the Head of Committee after deliberation in the Committee.

Article 20. (Enforcement rules) Requirements to implement this ordinance shall be specified and set as rules:

Supplementary Provisions

〈Ordinance No. 126 established on 1 July 2010〉

Article 1. (Enforcement date) This ordinance shall take effect on the day of its proclamation.

Article 2. (Abrogation of previous ordinances) Previous ordinances regarding rainwater management in Changwon and installation of rainwater utilization facilities in Jinhae shall be abrogated upon enforcement date of the this ordinance.

Article 3. (Interim measures for Committee members) The members of the previous ordinances for Rainwater Management in Changwon shall be assumed to be resigned from the position on the enforcement date of this ordinance.

Supplementary Provisions



〈Ordinance No. 403 established on 20 January 2011〉

(Established by Changwon Administrative Agency)

Article 1. (Enforcement date) This ordinance shall take effect on the day of its proclamation and apply on the first day that personnel are appointed based on this ordinance.

Article 2,3 and 4 are omitted.

Article 5. (Revision of other ordinances) ① to <77>are omitted.

SOC Code	Category	Indicator	State	Trend
024	Water use and supply management	Incidences/deaths due to waterborne diseases 수인성 질병에 의한 발병률/사망률		

Description	This indicator measures the number of reported cases and number of deaths due to diarrhea and other waterborne diseases.
Rationale	While other factors (such as food handling practices, etc.) may affect these figures, the prevalence of diarrhea and waterborne diseases also indicate the level of sanitation services and the cleanliness of freshwater supplies and of bodies of water for recreation.
Data requirements	<ul style="list-style-type: none"> Number of incidences of illness/infections and deaths due to waterborne related diseases (e.g., diarrhea; typhoid fever; cholera; amoebiasis; schistosomiasis; giardiasis; etc.)
Guide Questions	1. What are the current morbidity/mortality statistics related to waterborne disease? What are the trends/changes?
Results	As of 2011, seven people suffered waterborne illnesses which were considered Type 1, the most serious infectious disease: shigellosis, typhoid fever, paratyphoid fever, enterohemorrhagic escherichia coli and cholera.

• Results and Recommendation

Table 17. Waterborne Disease Outbreaks in Changwon City.

Year	Subtotal	Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic escherichia coli
2011	7	0	4	0	3	0
2010	9	0	5	0	4	0
2009	11	0	5	0	3	3
2008	13	0	7	0	4	2
2007	12	0	6	0	6	0
2006	12	0	5	1	5	1
2005	3	0	1	1	0	0
2004	21	0	5	1	14	1
2003	155	0	5	37	113	0
2002	188	0	5	3	180	0
2001	84	0	7	2	75	0



Waterborne epidemic

Waterborne epidemic (eg. shigellosis, typhoid fever, paratyphoid fever, enterohemorrhagic escherichia coli and cholera) is considered Type 1, the most serious infectious disease and in order to prevent any further spread of epidemic, those infected should be quarantined by the Health Authority until that no relevant pathogenic microorganism is found in one's excrement-two tests will be conducted every 24 hours and the result should be negative. Hands need to be washed after the test as microorganisms could spread through one's hands.

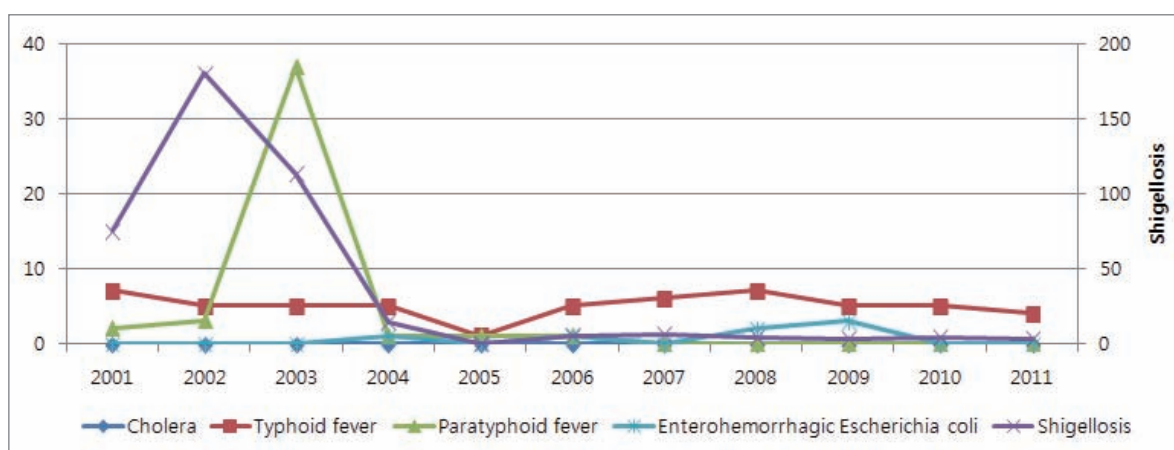


Figure 49. Present status of water-borne infectious diseases in Changwon (2001-2011)

Table 18. Present status of water-borne infectious diseases in Changwon
website: <http://stat.cdc.go.kr>

2011	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	7	0	4	0	3	0
Masan Hampo-gu	0	0	0	0	0	0
Masan Haewon-gu	2	0	2	0	0	0
Seongsan-gu	2	0	0	0	2	0
Yichang-gu	2	0	1	0	1	0
Jinhae-gu	1	0	1	0	0	0

2010	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	9	0	5	0	4	0
Masan City	4	0	1	0	3	0
Jinhae City	2	0	2	0	0	0
Changwon City	3	0	2	0	1	0

2009	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	11	0	5	0	3	3
Masan City	6	0	1	0	2	3
Jinhae City	2	0	2	0	0	0
Changwon City	3	0	2	0	1	0

2008	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	13	0	7	0	4	2
Masan City	6	0	3	0	3	0
Jinhae City	1	0	0	0	0	1
Changwon City	6	0	4	0	1	1

2007	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	12	0	6	0	6	0
Masan City	7	0	2	0	5	0
Jinhae City	0	0	0	0	0	0
Changwon City	5	0	4	0	1	0

2006	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	12	0	5	1	5	1
Masan City	5	0	2	0	3	0
Jinhae City	2	0	2	0	0	0
Changwon City	5	0	1	1	2	1





2005	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	3	0	1	1	0	0
Masan City	0	0	0	0	0	0
Jinhae City	0	0	0	0	0	0
Changwon City	3	0	1	1	0	1

2004	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	21	0	5	1	14	1
Masan City	11	0	1	0	10	0
Jinhae City	3	0	1	0	2	0
Changwon City	7	0	5	1	2	1

2003	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	155	0	5	37	113	0
Masan City	101	0	2	17	82	0
Jinhae City	10	0	0	2	8	0
Changwon City	44	0	3	18	23	0

2002	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	188	0	5	3	180	0
Masan City	161	0	1	2	158	0
Jinhae City	3	0	2	1	0	0
Changwon City	24	0	2	0	22	0

2001	Subtotal	Type 1 disease				
		Cholera	Typhoid fever	Paratyphoid fever	Shigellosis	Enterohemorrhagic Escherichia coli
Total	84	0	7	2	75	0
Masan City	73	0	1	2	70	0
Jinhae City	3	0	3	0	0	0
Changwon City	8	0	3	0	5	0

SOC Code	Category	Indicator	State	Trend
025	Food security and livelihood management 식품안전과 생활관리	Fishery management planning and implementation 어업관리계획과 이행		

Description	This indicator estimates the extent of fisheries management efforts through availability of fisheries management plans, staff and budget allocated.
Rationale	Fish are a direct product of the coastal zone, providing both food and livelihoods to coastal dwellers, and to consumers far from the coast. Fisheries management is a challenging but necessary aspect of managing marine and coastal resources in order to ensure the sustainability of this valuable natural asset. A management strategy, being supported by adequate resources and equipment, are markers of local government to managing this resource.
Data requirements	<ul style="list-style-type: none"> • Fisheries Management Plan • Staff and budget allocation for fishery management
Guide Questions	<ol style="list-style-type: none"> 1. Has a fisheries management plan been developed? When? What is the scope of the plan and the agency/ies responsible for its implementation? 2. What is the resource commitment (i.e., personnel and budget allocation) for fisheries management?
Results	<p>In order to improve the deteriorated competitiveness of fishing industry due to changes in the fishing environment, overfishing and oil price peaks, Changwon City established policy plans increasing fishery resources while decreasing the proportion of fishing, accelerating the recovery process of fishery resources.</p> <p>Such policies were considered given the facts that the fishing industry in Gyeongnam including Changwon had thrived in the 1980s with the total catch of fish amounting to 320,000 tons but the figure went back and forth to 250,000, 220,000 and 250,000 in 2008, 2009 and 2010 respectively and the population of fishing villages was aging rapidly with the people mainly in their mid-to-late 40s and 50s. Considering the circumstances, Changwon City plans to invest about KRW 1.6 billion to enhance the competitiveness of the fishing industry and increase fishery resources by expanding Fish Seed Release Project, establishing additional fishing farms, and artificial seeds care facilities and releasing fertilized eggs of cod, creating a sound ecological environment.</p>

Results	<p>In particular, to cut the haul of coastal fishery, Changwon City reduced 195 inshore fishing vessels and plans to invest about KRW 2.7 billion to reduce 29 and 26 boats in the first and second half of the year, respectively. By downsizing the fish catch, Changwon City tries to improve the competitiveness and secure sustainable productivity. For customized fishery resources management based on fish seed, business and sea area, a survey was conducted on people in the fishing industry to select fishing seeds for release and more effort will be made to increase fishery industry income by focusing on certain seeds with high added-value and growth. In addition, Changwon City stated that they would sophisticate the fishery industry structure by converting it from the primary industry to the senary industry which integrates production, distribution and tourism and establish a variety of policies to increase the income by expanding distribution facilities and promoting exploration tour apart from fishery itself.</p>
---------	---



Table 19. Current status of fishery resources projects

Project	Year	Project size	Investment (KRW)	Note
Small-scale Ocean Farm Establishment Project	2009	100 seaweed forest, 140 artificial seaweed	780.481 mil	
	2010	102 artificial seaweed	400.058 mil	
	2011	49 seaweed forest, 38 artificial seaweed	449.427 mil	
Fish Seed Release Project	2009	1,945,000	586 mil	
	2010	2,658,000	558 mil	
	2011	1,623,000	634 mil	
Cod Fertilized Egg Release Project	2009	2,343 mil fertilized eggs of cod	77.778 mil	
	2010	2,313 mil fertilized eggs of cod	107.951 mil	
	2011	2,484 mil fertilized eggs of cod	132 mil	



SOC Code	Category	Indicator	State	Trend
026	Food security and livelihood management	Fisheries Production 어업 생산량		
Description	This indicator measures the trend in fisheries production and tries to estimate whether fisheries stocks are sustainable (using changes in catch composition and/or the frequencies of various sizes per species).			
Rationale	The increasing fish catch would mean either greater dependence of the population to fisheries' resources or improved condition of resources.			
Data requirements	<ul style="list-style-type: none"> • Municipal (small-scale), commercial (large-scale) and aquaculture fishery production • Size and composition of fish catch 			
Guide Questions	<ol style="list-style-type: none"> 1. Are there any significant changes in terms of fisheries (municipal, commercial, aquaculture) production over time? What are they? 2. Are there any changes in terms of sizes and composition of fish catch over time? What are they? 			
Results	2010, Catches by Fishery was 598,000 M/Ton, 134,174,851,000 ₩			



Figure 50. Fishery market

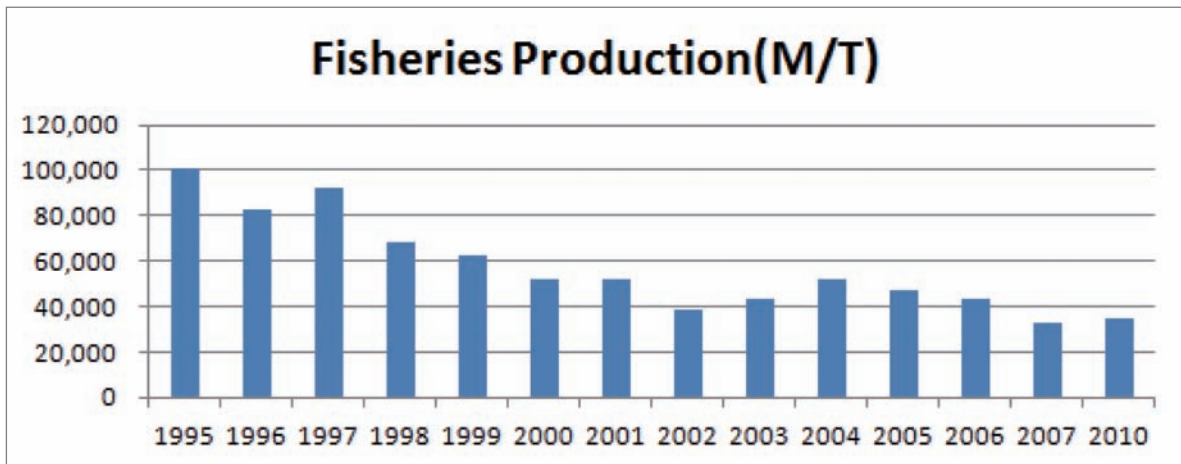


Figure 51. Fisheries Production (M/T)

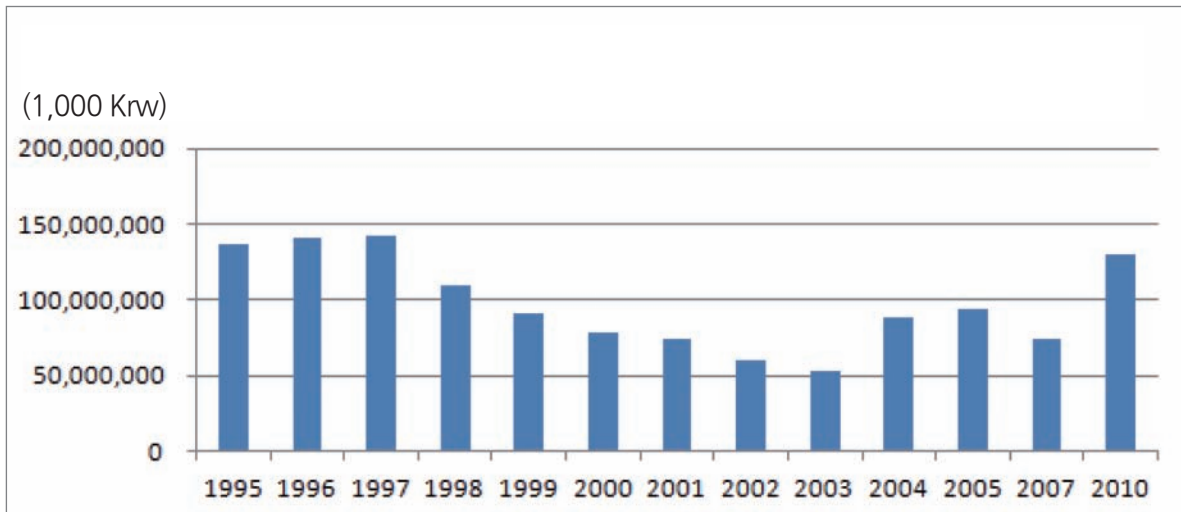




Figure 52. Fisheries Production (Unit: 1,000won)

Changwon City (Masan City before merge) was an important harbor for fishery before 1995, recording 100,000ton of catch in 1995. Since then, the fishery catch decreased to 52,000ton in 2000, 47,000ton in 2005, and 34,000ton in 2010.

SOC Code	Category	Indicator	State	Trend
027	Food security and livelihood management	Malnutrition rate 영양실조 비율		

Description	This indicator measures the proportion of population with access to sufficient daily dietary requirements.
Rationale	Nutrition status is an indicator that integrates availability and equitability of access to food and livelihood. While other factors (such as agriculture and trade) may affect these figures, nutrition status is also affected by the availability of seafood.
Data requirements	<ul style="list-style-type: none"> • Number of undernourished males (all ages) • Number of undernourished females (all ages) • Number of undernourished males (less than 5 years old) • Number of undernourished females (less than 5 years old)
Guide Questions	<ol style="list-style-type: none"> 1. What is the current level of malnutrition among children (below 5 yrs old), as well as the general population? What are the trends over time? 2. Are there differences between the male and female populations in terms of malnutrition rates? What are the trends over time?
Results	2~3 persons of malnutrition

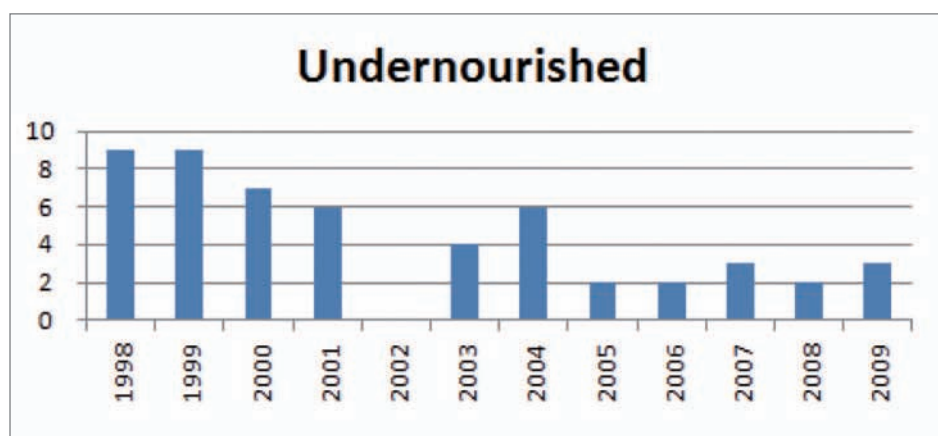




Figure 53. Number of undernourished people in Changwon(1998-2009)

SOC Code	Category	Indicator	State	Trend
028	Food security and livelihood management	Poverty, education and employment 빈곤, 교육과 고용		
Description	This indicator estimates the degree of poverty, employment and the potential for employment			
Rationale	The degree of poverty reflects an area's degree of social development. Productive employment is a foundational element needed to provide households with goods and services in their struggle against poverty, while education is a key to productive employment.			
Data requirements	<ul style="list-style-type: none"> • Poverty threshold • Poverty incidence • Income per capita (male/female) • Total employment (male/female) • Education; proportion of population (male/female; primary/secondary/tertiary) • Budget allocation for livelihood programs 			
Guide Questions	<ol style="list-style-type: none"> 1. Has there been a change in the number of impoverished individuals/families in the area? What are the trends over time? 2. Has there been a change in the employment rate in the area? What are the trends over time? 3. Has there been a change in the proportion of population attending primary, secondary and tertiary schools? What are the trends over time? 			
Results	<ul style="list-style-type: none"> - Changwon City is promoting the Changwon Hope New Deal project to establish a well-being city which can give hope to its citizens. With its welfare vision to create an inclusive city with happy citizens based on Changwon Hope New Deal project, Changwon City is putting its utmost effort on welfare policies to embrace all 1.1 million citizens while helping the marginalized to cut a vicious cycle of poverty and join the middle-class. Furthermore, additional plans have been established and promoted to support and expand volunteer service activities and establish an inclusive society via spreading hope, in order to boost cooperative participation among public and create public benefits. - Along with Health and Welfare Call Center(Call for Hope: 129), Changwon Welfare Counseling Center(212-3053~3057) provides counseling service and useful information and recruits social welfare integrated service providers to help the marginalized and enhance private welfare service. 			



• Results and Recommendation

Establishment of Changwon Hope New Deal Plans

As more households are experiencing difficulties due to inflation, increased housing costs, growing risks in families, the need for support the poor and the neglected, potential welfare recipients without government allowances has arisen. In this sense, Changwon City released Changwon Hope New Deal plans to cut a vicious cycle of poverty, prepare new response measures to welfare demands, internalize the existing welfare policies and make an inclusive city equipped with better living environment for citizens.

Changwon Hope New Deal Plan is a vision referring to the new start of Changwon City toward hope and it embodies active welfare policies like New Deal policy, giving new hope to citizens.

Based on the established policies, Changwon City will actively strengthen social safety net to protect citizens' lives, expand support for the vulnerable class who cannot make their ends meet, and provide jobs for low-income workers to escape poverty, avoid handing down poverty to the next generation and join the middle-income class.

The established policies include operation of Changwon Hope Bank which provides the neglected citizens in the welfare system with housing and living allowances by building a social safety net based on private-public cooperation.

To foster culture of donation, Changwon City also operates "Hope maker" Changwon Request which publicly collects donations supported by social contribution ordinance, newsletters, and media, and private and public welfare solution to eliminate blind spots in the welfare system and solve regional welfare issues. In addition, Changwon City supports living costs for the very poor without government support who do not fulfil certain requirements and expands emergency support up to 200% of the minimum living cost.

Reinforce welfare service for the weak and vulnerable

Changwon City operates a matching project to provide an opportunity for unmarried men and women to promote marriage and installs wheelchair battery charging stations for approximately 5,000 disabled people's convenience and lights for the hearing impaired.

In order to motivate productive leisure and active life after retirement, the city will operate three silver towns and enhance welfare service by expanding its range of beneficiaries from basic livelihood security recipients, motherless families to potential senior recipients who live alone and fatherless families by increasing the number of safety keepers for the aged population, granting interest exemption on loans, and reinforcing support for single parent families.

Provide jobs to escape poverty

Changwon City provides financial consulting service to help assess low-income workers' debt and help them stand on their own feet. City also builds job centers for seniors and support funds to women in institutional care to be financially independent after leaving the facilities. Moreover, mobile consulting group, care service for low-income seniors who live alone and more job opportunities for the aged will be promoted.

Foster future citizens

As students do not go to school on Saturdays from next year, Changwon City funds tuitions for students from low-income families who cannot afford to go to universities and operates Saturday learning programs in Children's centers for children from low-income families, supporting children safety and education. The city also funds education expenses for teenagers from low-income families who dropped out of high school and operates five multi-cultural daycare facilities to help children from multi-cultural families. The scope of beneficiaries for private education matching program will be expanded from basic livelihood security recipients and single-parent families to the potential welfare recipients and toy library which was built in Jinhae only will be built in each borough in the future.



Figure 54. The Plan of Livelihood Security System in Changwon.



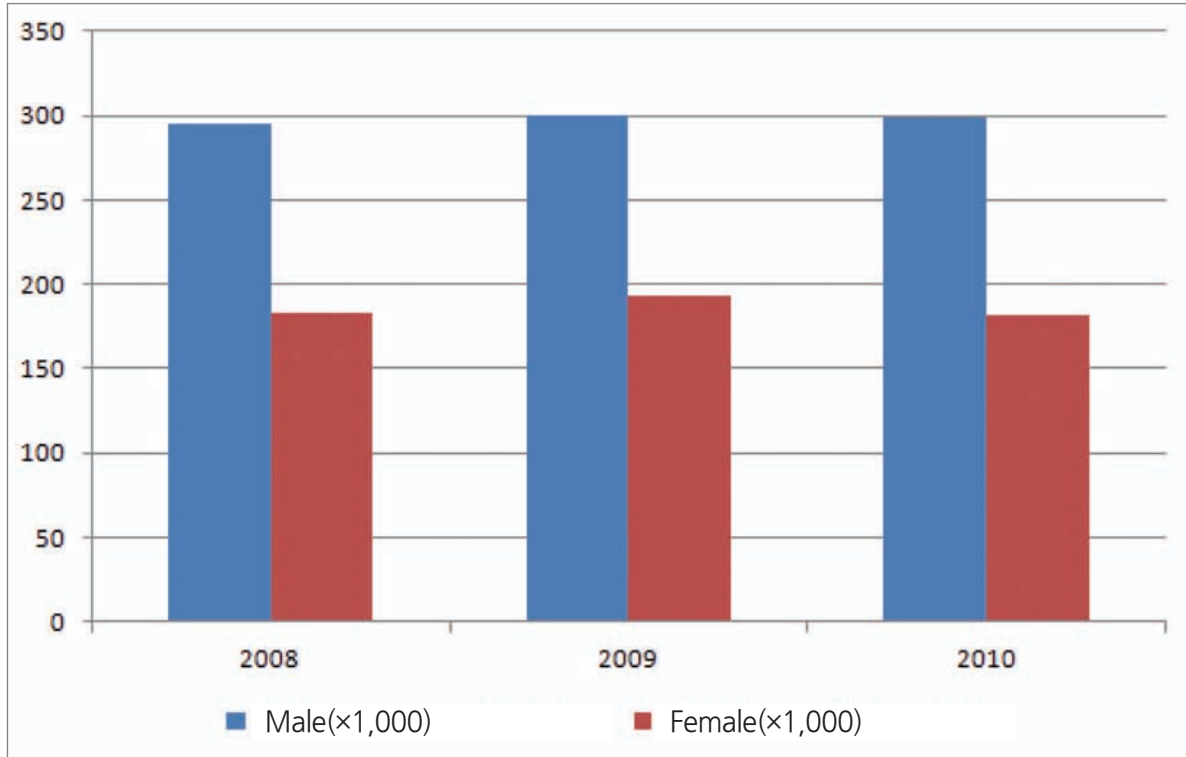


Figure 55. The economically active population in Changwon.

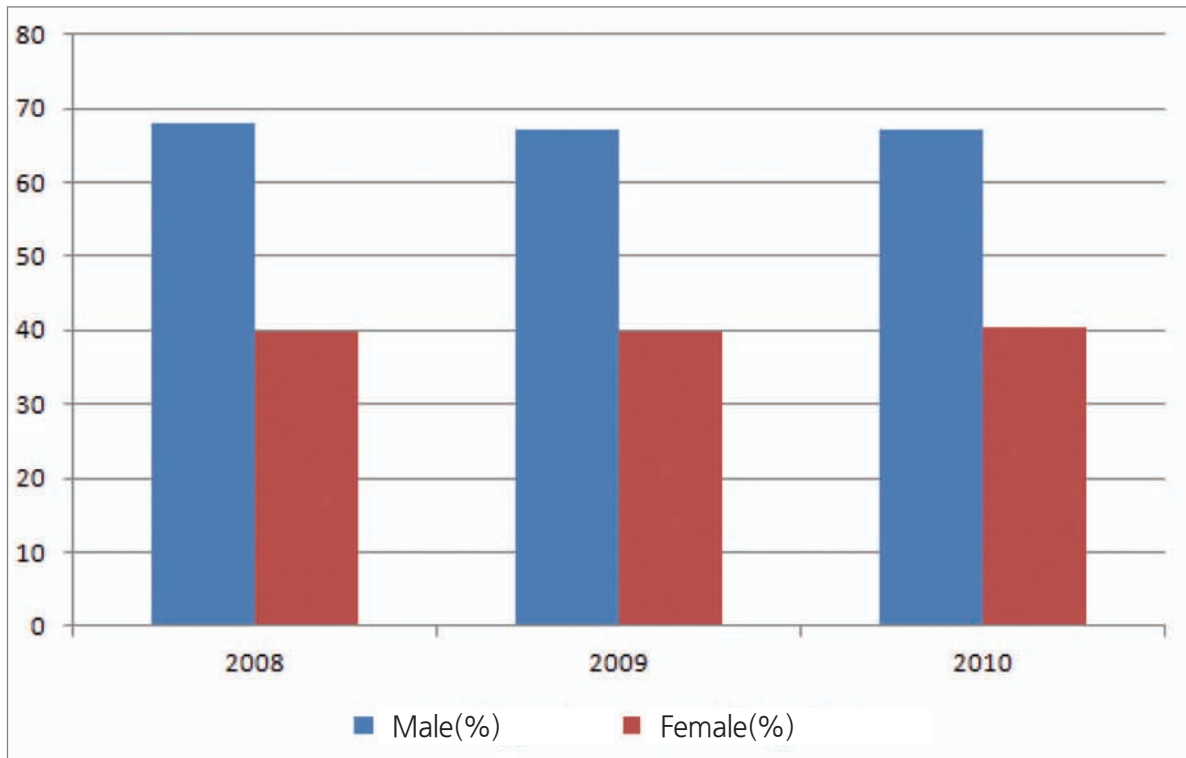


Figure 56. The Employment Rate of Changwon.

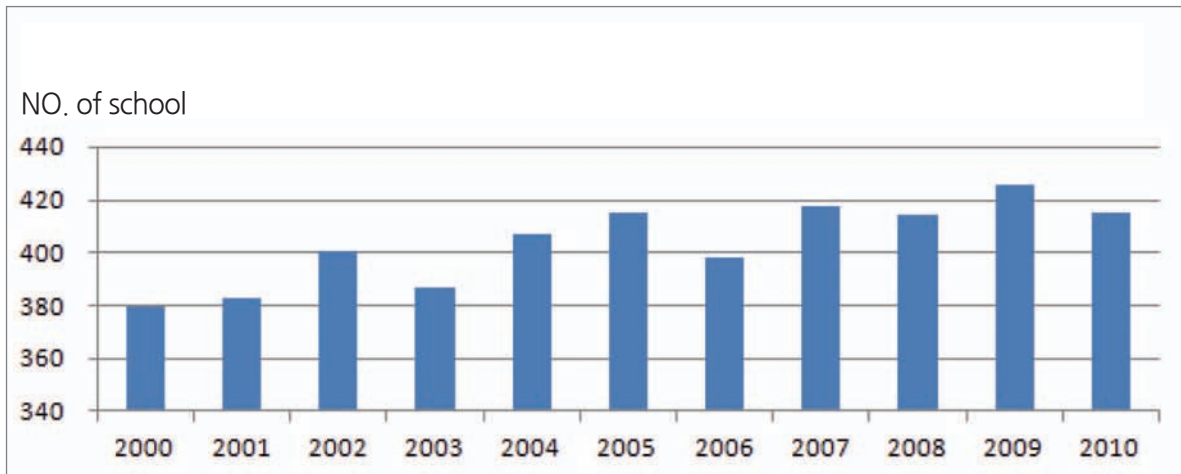


Figure 57. The Total number of School in Changwon.
(kindergarten, primary school, middle school, high school, university)

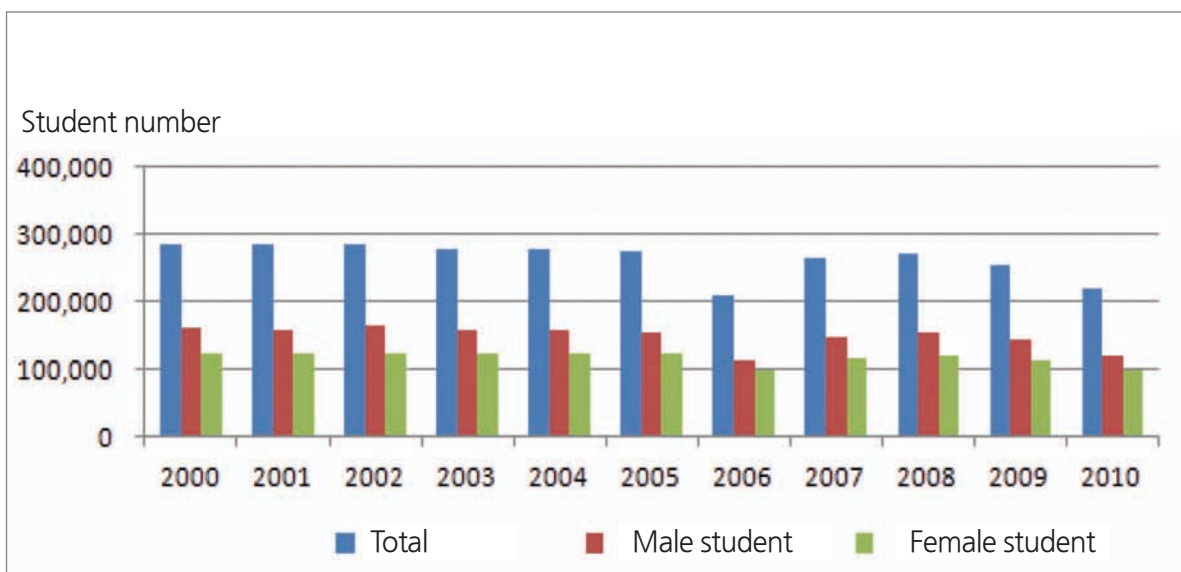




Figure 58. The Total number of Students in Changwon.
(kindergarten, primary school, middle school, high school, university)

SOC Code	Category	Indicator	State	Trend
029	Food security and livelihood management	Livelihood programs 생계 프로그램		

Description	This indicator measures the availability of programs, people, and budget to help enhance coastal livelihoods. It also looks into the sectors benefited and the impacts of these livelihood programs.
Rationale	Livelihood programs help optimize productivity of coastal areas and help households maximize their potential for income.
Data requirements	<ul style="list-style-type: none"> • Existing livelihood programs • Staff and budget allocation for livelihood programs • Accessibility and budgets • Sectors covered • Impacts of livelihood programs
Guide Questions	<ol style="list-style-type: none"> 1. What livelihood programs are available and accessible in the area? Which organizations are implementing livelihood programs and which sectors of the community benefit from these programs? 2. What impacts have occurred/been felt by the concerned sectors as a consequence of livelihood programs? 3. What is the local government's allocation of staff and budget for livelihood programs? What are the trends over time?
Results	As for the individual and household under the absolute poverty line that cannot make ends meet on their own, the Korean government provides basic allowances for living, education, health care, housing and self-support through National Basic Livelihood Security System.

• Results and Recommendation

National Basic Livelihood Security System System Overview

The system is to ensure basic livelihood of individuals and households in the absolute poor class that cannot make a living on their own, covering education, health care, housing and self-support allowances. The article 34 of the Constitution specifies that all citizens reserve the right to a decent standard of living and the country and local governments have obligations to protect and guarantee such rights. Changwon City felt the need to prepare innovative measures to protect such constitutional right and build a productive welfare nation. In this sense, on 7 September 1999, the Korean government worked with the National Assembly and civic organizations and established a security system ensuring basic livelihood of low income families who needed the government's protection.



Selection of beneficiaries and granting allowance

How to apply for allowance

According to the Article 21 Section 1 of the Act, only the member of low income family, relatives or individuals related to the family may apply for the allowances. However, if the applicant cannot submit the application due to diseases or difficulty moving, the responsible person for Basic Livelihood Security System at the town office may have the applicant's consent and submit the application on behalf of the applicant based on the Article 21 Section 2 of the Act.

※ Documents required: Application for welfare allowances and agreement on disclosure of financial transaction information (property-related documents such as house lease agreement, proof of enrollment and doctor's note have to be submitted if required)

Income and property investigation

How to apply for allowance

According to the Article 22 of the Act, the responsible person for Basic Livelihood Security System at district office will determine whether to grant allowance after investigating income and property of the applicant, applicant's family members and any person with support obligations for the applicant.

※ Person with support obligations for the applicant may be the applicant's spouse, immediate family such as parent, son and daughter and immediate family member's spouse such as son or daughter in law

Grant of allowance

The applicant whose income is lower than the minimum cost of living of the year and who is proved through the investigation to be not able to make ends meet with or without the person with support obligations or not able to receive any support from the person with support obligations will be selected as a recipient.

Table 20. Minimum cost of living per household in 2010

No. of family members	1	2	3	4	5	6
in 2010 (KRW/month)	504,344	858,747	1,110,919	1,363,091	1,615,263	1,867,435

※ As for the family with more than 6 members, KRW 252,172 should be added for each additional member (eg. 7 family members: KRW 2,119,607)

Table 21. Changes in the number of recipients of the National Basic Livelihood Security in Changwon

Year	Total no. of recipients (household)	Total no. of recipients (person)
2000	9,108	18,777
2001	9,176	17,393
2002	9,221	17,743
2003	9,995	18,918
2004	10,866	20,261
2005	10,748	20,441
2006	11,175	20,878
2007	12,690	22,192
2008	12,838	21,707
2009	13,313	22,423
2010	13,465	22,187

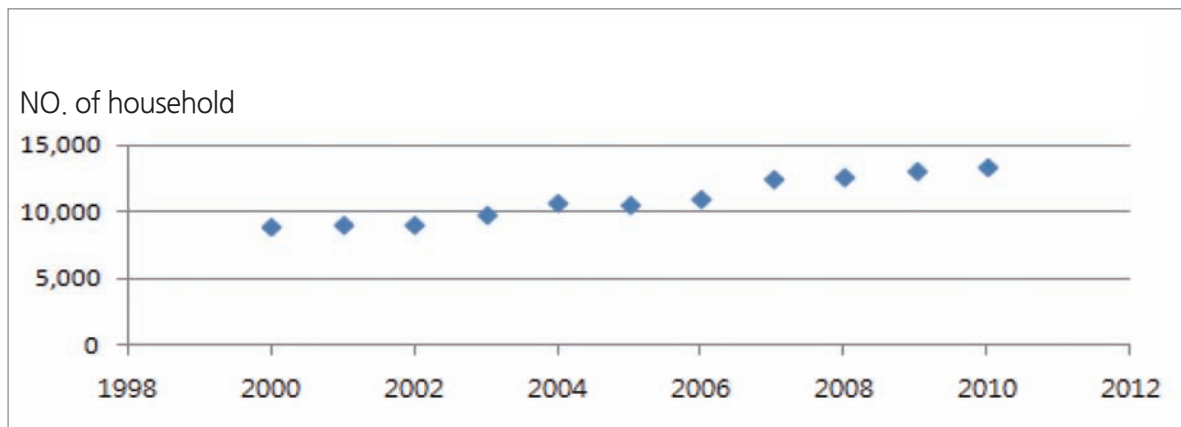


Figure 59. The National Basic Livelihood Security recipients house

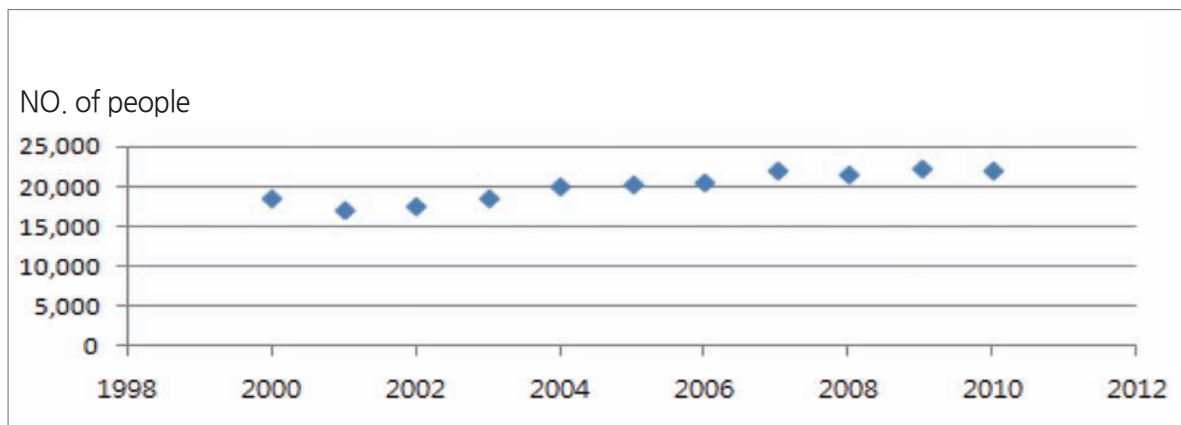




Figure 60. The National Basic Livelihood Security recipients

Changwon City is implementing the welfare policy of “Happy People, Kind City, Hope New Deal, Changwon Welfare Vision,” so that every 1.1 million people may access to welfare program. The number of household which are financially supported by the Law on Basic Life Support is increasing from 9,108 in 2000, to 10,748 in 2005 and 13,465 in 2010.

SOC Code	Category	Indicator	State	Trend
030	Pollution and waste management 오염과 폐기물 관리	Pollution Management plans 오염 관리 계획		

Description	This indicator accounts the presence of specific policies, plans and programs for pollution reduction and waste management. It further looks into the commitment of local government to implement the plans through allocation of human and financial resources.
Rationale	Specific strategies and action plans are essential to address issues on pollution and waste management. These action plans must be implemented through the commitment of facilities and equipment, as well as financial and human resources.
Data requirements	<ul style="list-style-type: none"> • Availability of pollution management plans and their scope (water, air, land) • Monitoring programs • Budget for pollution and waste management • Staff allocation for pollution and waste management • Adequacy of equipment/facilities
Guide Questions	<ol style="list-style-type: none"> 1. Has/have a pollution reduction/waste management plan(s) been developed and adopted? When? What is/are the scope of the plan(s), and the agencies responsible for the implementation? 2. Has an environment monitoring program been established? When? What is its coverage (i.e., geographic areas, media, and parameters)? How is the monitoring data recorded, analyzed and disseminated? 3. What facilities and equipment are available for pollution reduction and waste management? 4. What is the local government's resource commitment (i.e., personnel; budget) to pollution reduction and waste management?
Results	<ul style="list-style-type: none"> - Ensuring incremental and sustainable management based on Management Priority - Encouraging Participation of and Cooperation with local stakeholders. - Application of the Precautionary Approach and establishment of an Integrated Watershed Management System - Establishment of Firm Scientific Platform to support decision-making processes



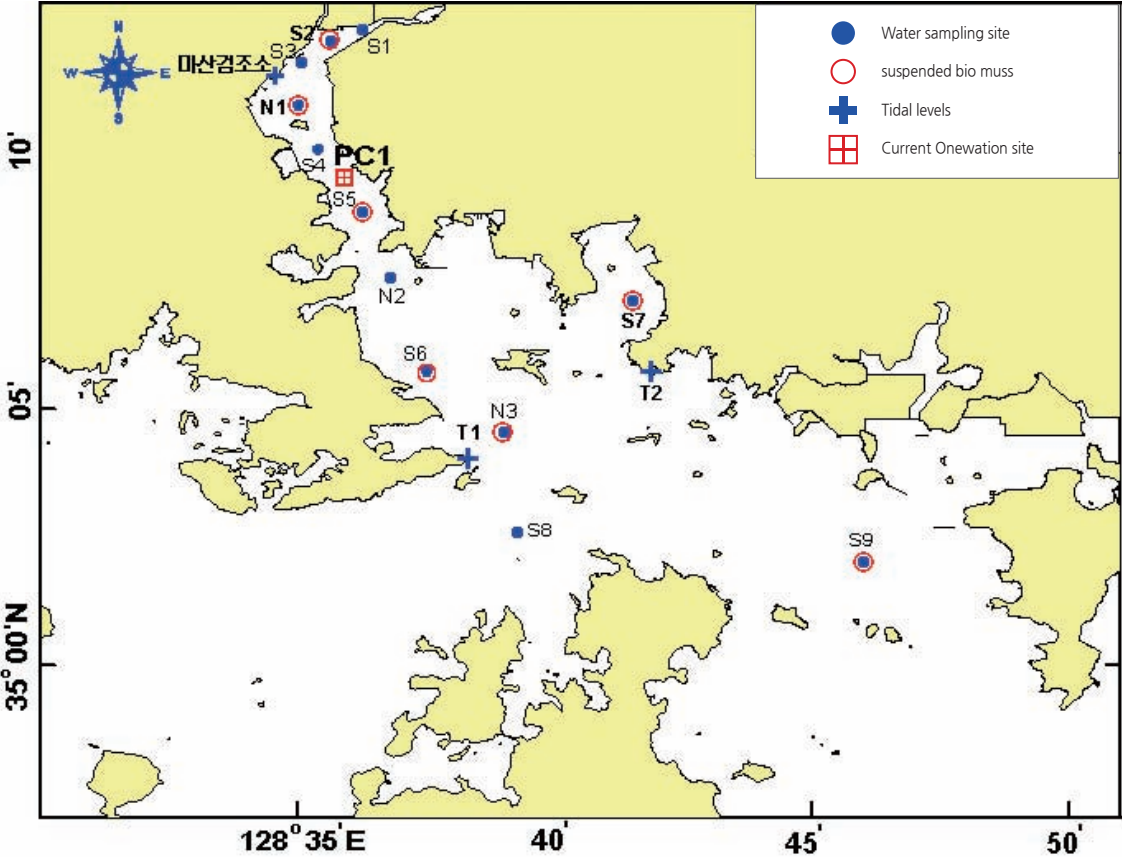


Figure 61. Monitoring site since 2006 by NFRDI (National Fisheries Research and Development Institute)

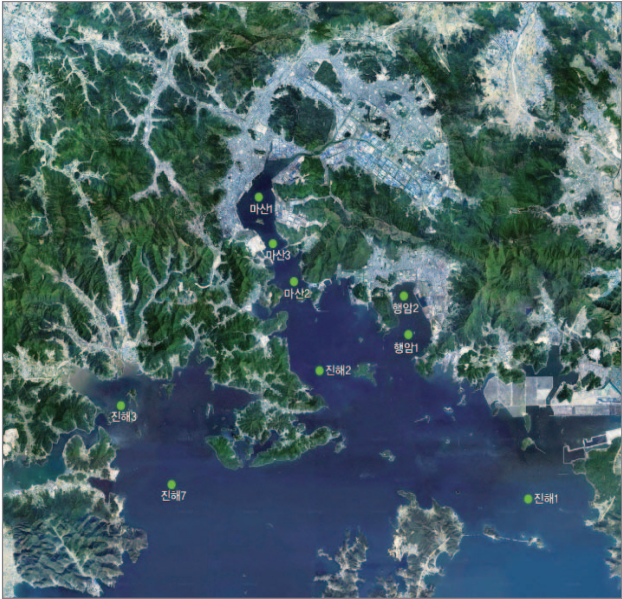


Figure 62. Monthly monitoring on water quality since 2006 by NFRDI (National Fisheries Research and Development Institute)

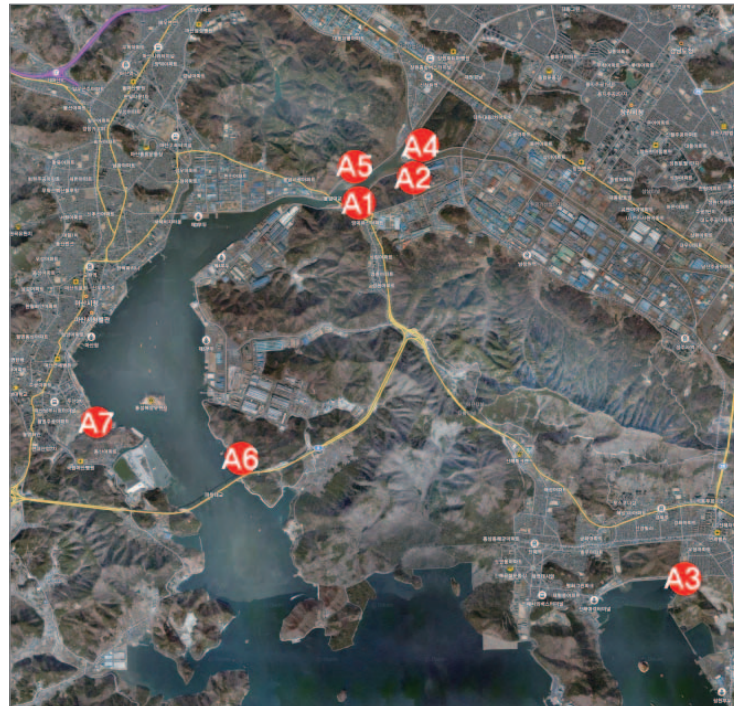


Figure 63. Monthly monitoring on marine debris from 2008 by Kyungnam University with NGO.



Orientation of clean up marine litter



Group photo



Collection of marine litter



survey cards

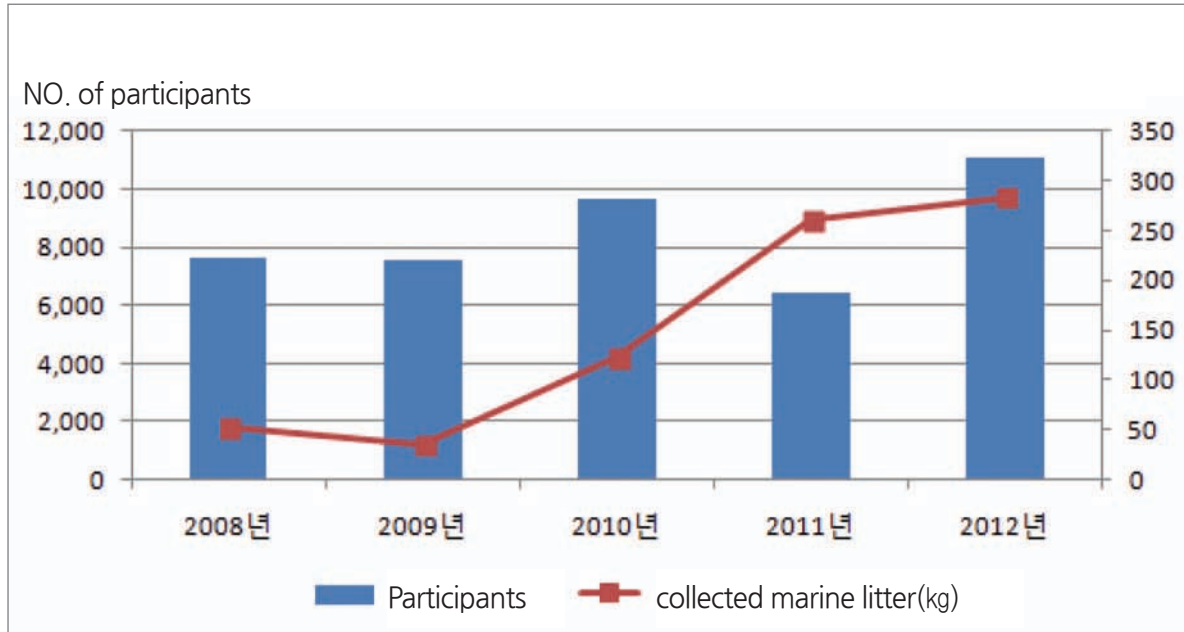


Figure 64. No. of participants in International Coastal Clean-up Day Activities and collected marine litter amount





Figure 65. International Coastal Clean-up Day Activities in Masanbay



Figure 66. Coastal Clean-up Manual in Masanbay

Changwon City is making effort to solve the problem of marine debris. Citizens are participating in International Coastal Cleanup every year since 2008, and Cleanup Manual for Changwon City was published.

SOC Code	Category	Indicator	State	Trend
031	Pollution and waste management	Water quality 수질		

Description	This indicator measures the level to which coastal waters and river waters that discharge into the coastal area are within the water quality standards prescribed for the specific water use (e.g., drinking, swimming, boating, fishing, aquaculture, etc.).
Rationale	Criteria and standards for water quality are based on scientific information related to water use and potential risks to human health (e.g., transmit water-borne diseases), productivity (e.g., decrease fisheries productivity) and/or the ecosystem health (e.g., destruction and degradation of habitats). Different parameters provide indications of ecosystem health and potential threats to water use.
Data requirements	<p>Priority parameters</p> <ul style="list-style-type: none"> • Changes (temporal/spatial) in water transparency (secchi depth/total suspended solids) (marine/river/beach) • Changes (temporal/spatial) in dissolved oxygen (DO) concentrations (marine/river/beach) • Changes (temporal/spatial) in total/fecal coliform counts (marine/river/beach) <p>Secondary parameters</p> <ul style="list-style-type: none"> • Changes (temporal/spatial) in chlorophyll concentrations (marine/river/beach) • Changes (temporal/spatial) in nutrient (nitrates, phosphates) concentrations (marine/river/beach) • Changes (temporal/spatial) in biochemical oxygen demand (BOD) concentrations (marine/river/beach) • Groundwater quality (nitrates and heavy metals)
Guide Questions	<ol style="list-style-type: none"> 1. What changes are occurring in water quality in terms of the priority (TSS, DO, coliform) and secondary (BOD, nutrients, chlorophyll) parameters. What are the trends over time? 2. What are the water quality standards/criteria for the area and different uses? Are these standards/criteria being met? What are the trends over time?



Results	The TPLM target of water quality was achieved, COD of seawater was under 2.0mg/L in 2011.
---------	---

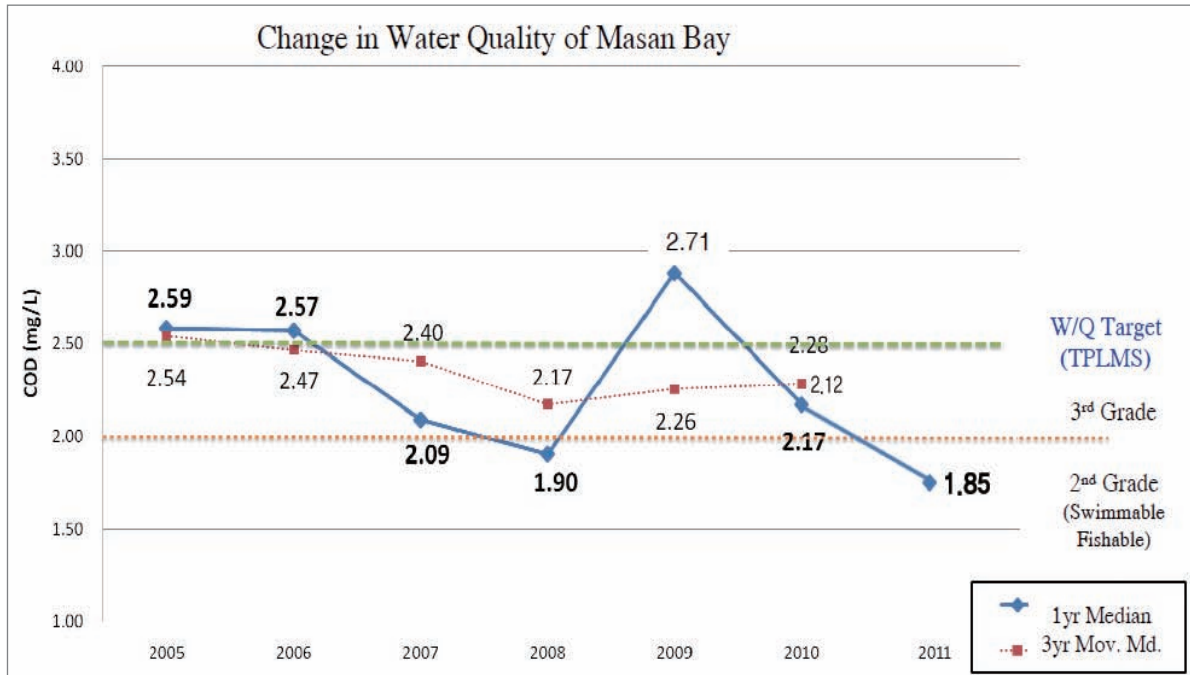


Figure 67. Change in Water Quality of Masan Bay

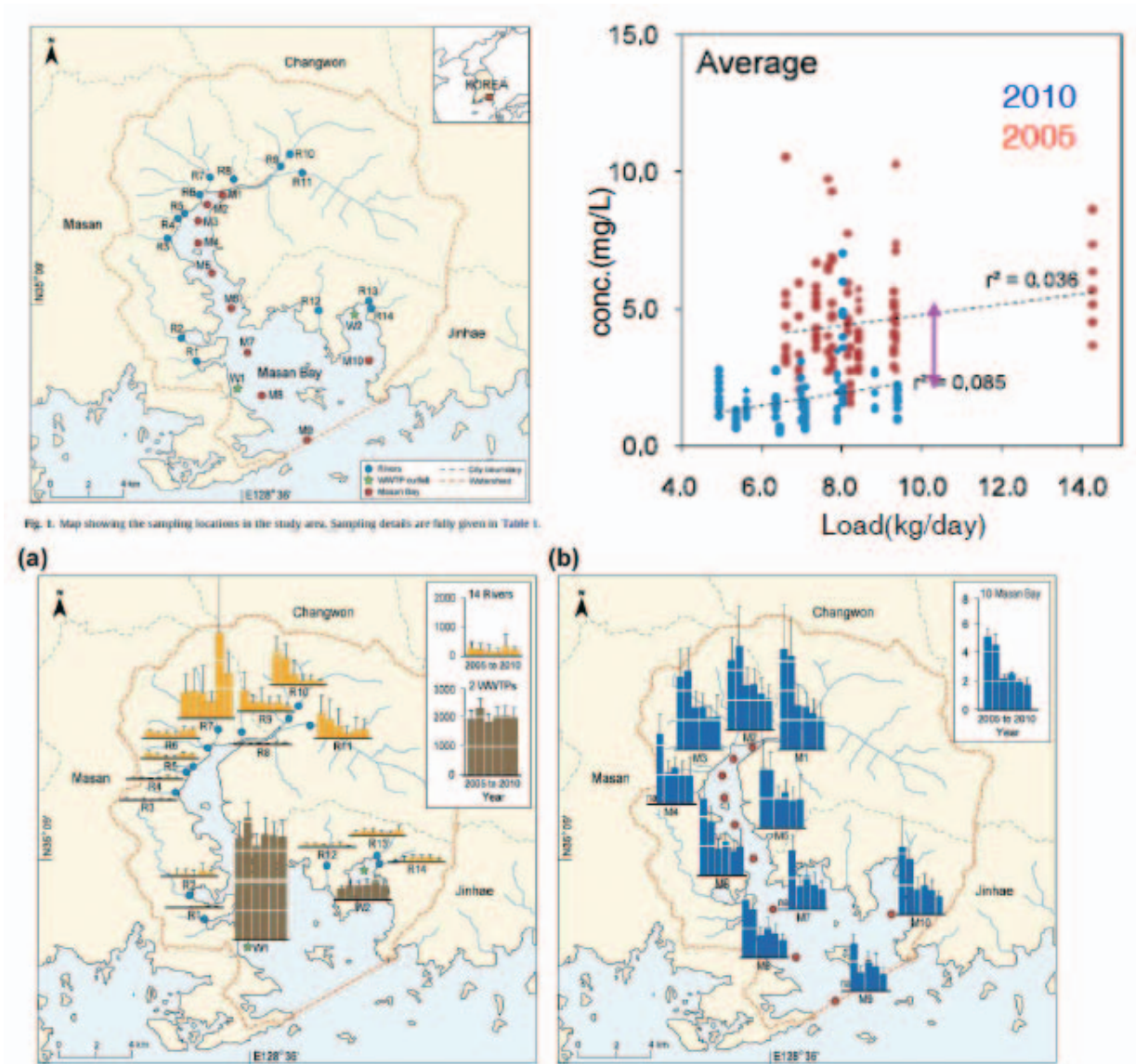


Figure 68. Spatiotemporal distribution of COD budget in Masan Bay, showing (a) annual mean COD loads (kg/d) from the inland rivers and WWTPs and (b) annual mean COD concentrations (mg/L) in the Masan Bay over the six-year period (2005-2010).

Table 22. Change in Water Quality of Masan Bay

Year	Hydrogen ion concentration			Dissolved Oxygen			Chemical Oxygen Demand			Nitrogen			Phosphorus			Suspended solid			Chlorophyll a		
	(pH)			(mg/L)			(mg/L)			(mg/L)			(mg/L)			(mg/L)			($\mu\text{g/L}$)		
	Surface layer	Bottom layer	Average	Surface layer	Bottom layer	Average	Surface layer	Bottom layer	Average	Surface layer	Bottom layer	Average	Surface layer	Bottom layer	Average	Surface layer	Bottom layer	Average	Surface layer	Bottom layer	Average
1997	8.2	8.1	8.2	7.4	5.4	6.4	3.4	3.0	3.2	-	-	-	-	-	-	8.2	-	8.2	-	-	-
1998	8.3	8.1	8.2	7.8	5.4	6.6	3.9	2.7	3.3	-	-	-	-	-	-	6.4	-	6.4	-	-	-
1999	8.4	8.3	8.4	9.9	6.8	8.4	4.2	2.5	3.4	-	-	-	-	-	-	7.1	-	7.1	-	-	-
2000	8.1	8.1	8.1	7.6	5.3	6.4	3.2	2.6	2.9	-	-	-	-	-	-	4.8	-	4.8	11.8	-	11.8
2001	7.9	7.9	7.9	7.0	7.3	7.1	2.7	2.8	2.8	3.0	2.4	2.7	0.2	0.2	0.2	6.4	-	6.4	10.9	-	10.9
2002	8.0	8.0	8.0	7.6	5.6	6.6	2.5	2.5	2.5	1.2	0.9	1.1	0.1	0.1	0.1	9.4	-	9.4	9.2	-	9.2
2003	7.8	7.8	7.8	9.2	9.1	9.1	2.7	2.7	2.7	0.8	0.8	0.8	0.1	0.1	0.1	6.6	-	6.6	15.6	-	15.6
2004	8.2	8.0	8.1	8.3	6.0	7.1	2.7	2.0	2.3	0.8	0.6	0.7	0.1	0.1	0.1	5.7	-	5.7	7.5	-	7.5
2005	8.1	7.9	8.0	8.6	6.6	7.6	2.8	2.3	2.5	1.3	0.9	1.1	0.1	0.1	0.1	9.5	7.3	8.4	10.5	6.4	8.5
2006	8.3	8.0	8.1	9.9	6.8	8.3	3.0	2.0	2.5	0.7	0.6	0.6	0.1	0.1	0.1	8.1	7.6	7.8	23.5	14.4	18.9
2007	8.1	7.9	8.0	10.3	7.3	8.8	3.0	1.9	2.4	0.5	0.5	0.5	0.1	0.1	0.1	6.8	5.6	6.2	10.6	8.5	9.6
2008	8.2	8.0	8.1	9.1	6.6	7.8	2.6	1.9	2.3	0.5	0.5	0.5	0.1	0.1	0.1	9.6	8.2	8.9	15.9	11.5	13.7
2009	8.3	8.0	8.1	10.7	8.4	9.6	3.2	2.5	2.8	0.6	0.6	0.6	0.0	0.0	0.0	7.1	7.4	7.3	25.4	20.7	23.0
2010	8.1	7.9	8.0	9.2	7.8	8.5	2.6	2.3	2.4	0.5	0.5	0.5	0.1	0.1	0.1	5.9	6.7	6.3	11.6	10.1	10.9
2011	8.2	8.1	8.1	10.3	7.2	8.8	3.3	1.5	2.4	0.4	0.5	0.5	0.0	0.1	0.1	6.4	5.7	6.0	13.6	7.5	10.5

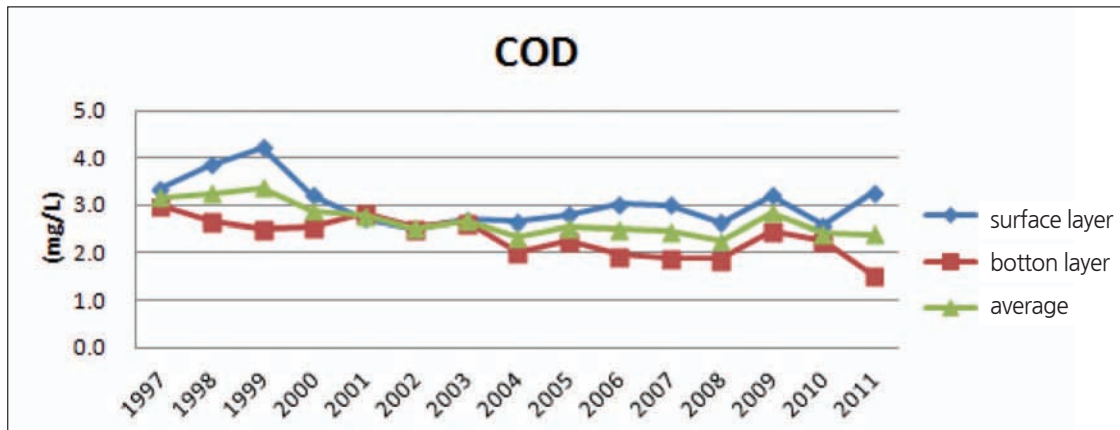


Figure 69. Change in Water Quality of Masan Bay(COD)

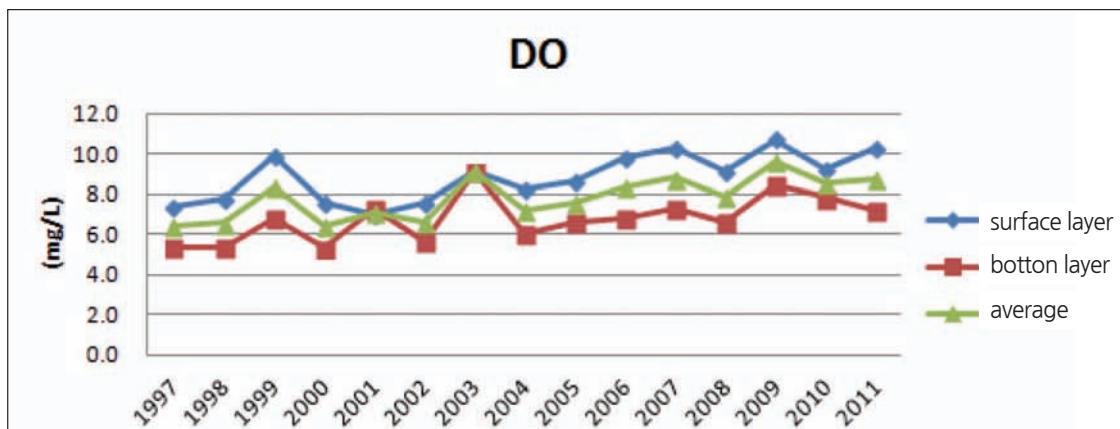


Figure 70. Change in Water Quality of Masan Bay(DO)



Figure 71. Monthly monitoring on stream water quality since 2005 by Kyungnam University.

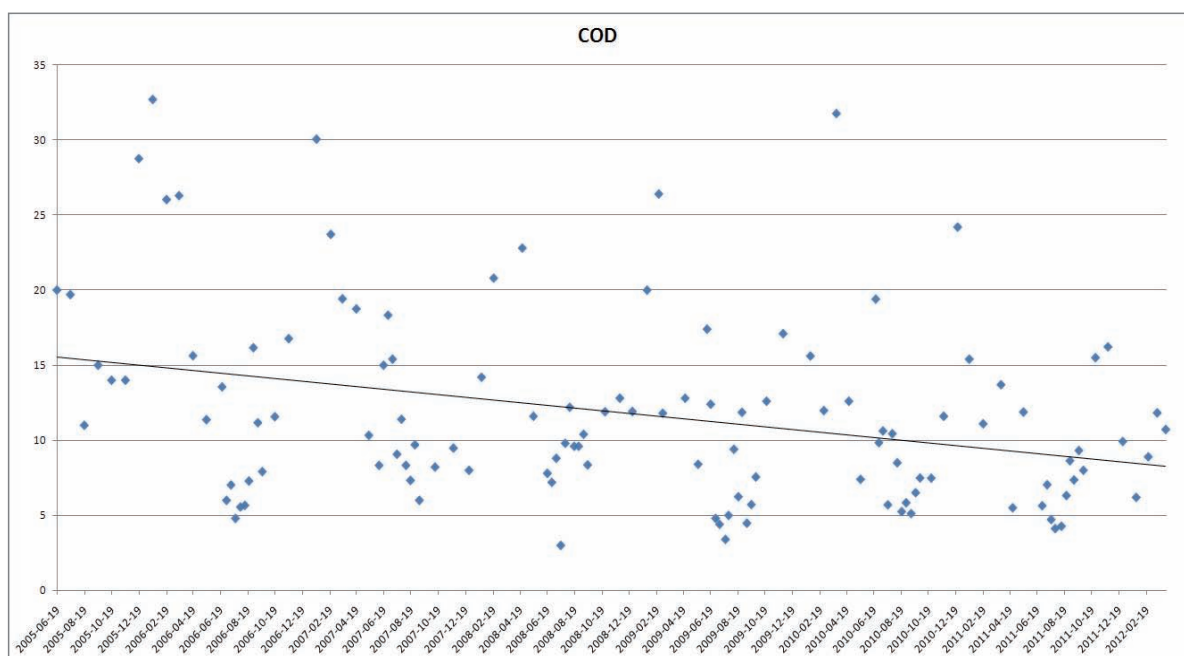


Figure 72. Changes in COD Concentration in Woelyoung Stream (2005-2012)

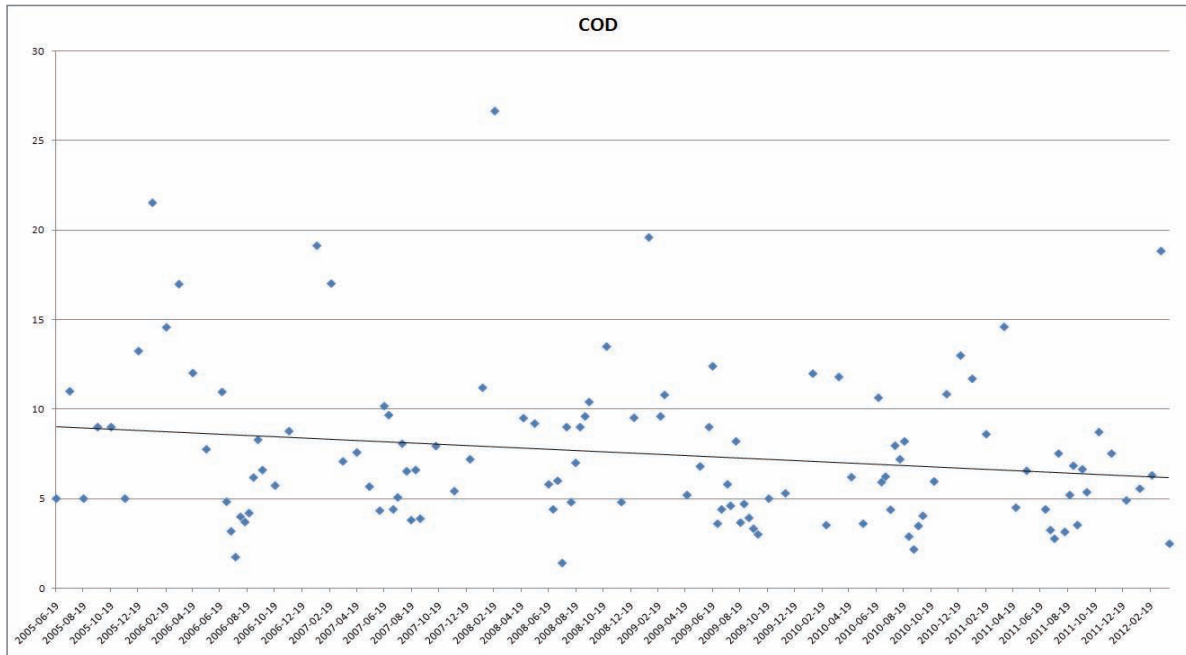


Figure 73. Changes in COD Concentration in Janggum Stream (2005-2012)

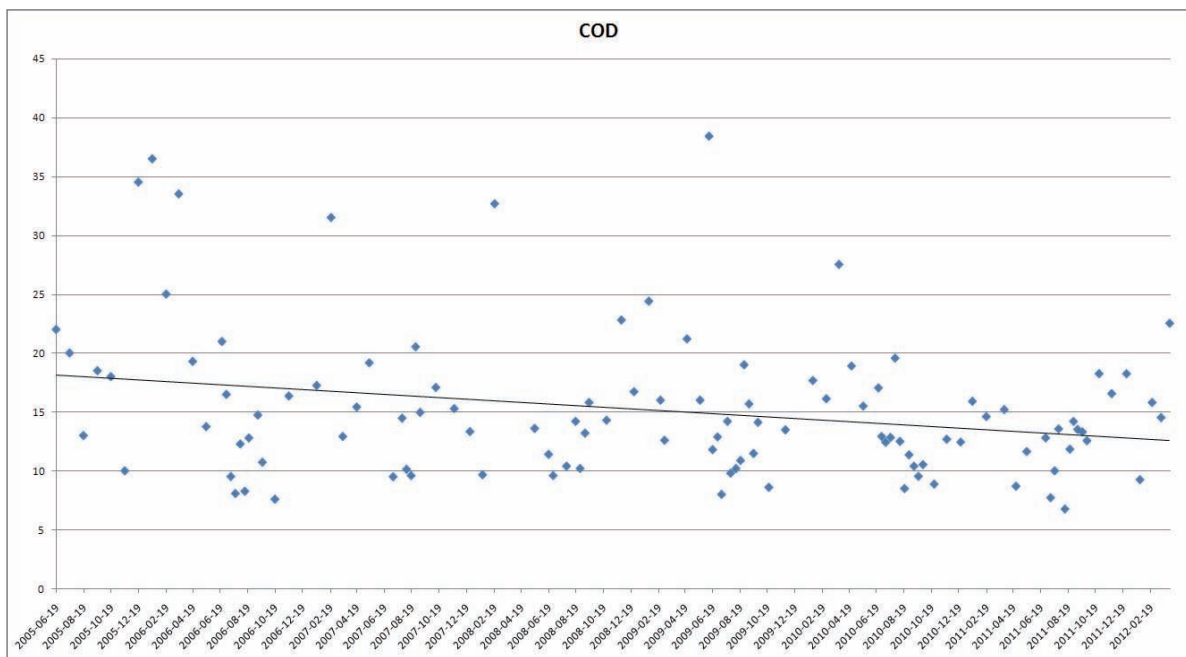


Figure 74. Changes in COD Concentration in Chuksan Stream (2005-2012)

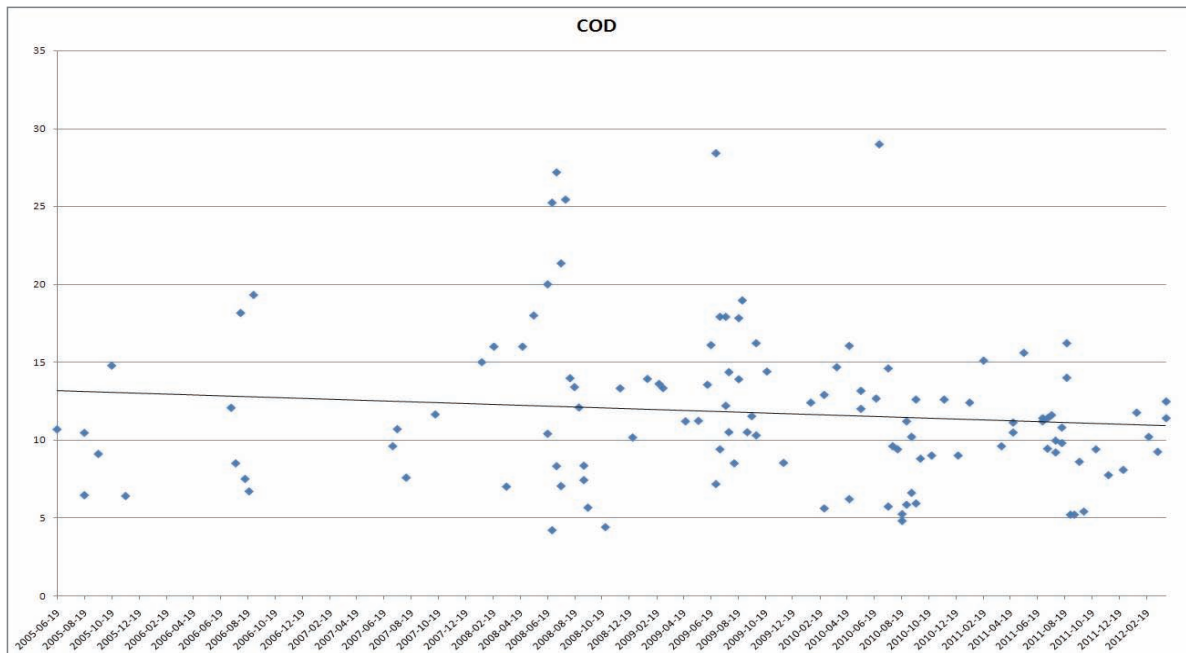


Figure 75. Changes in COD Concentration in Kyubang Stream (2005-2012)

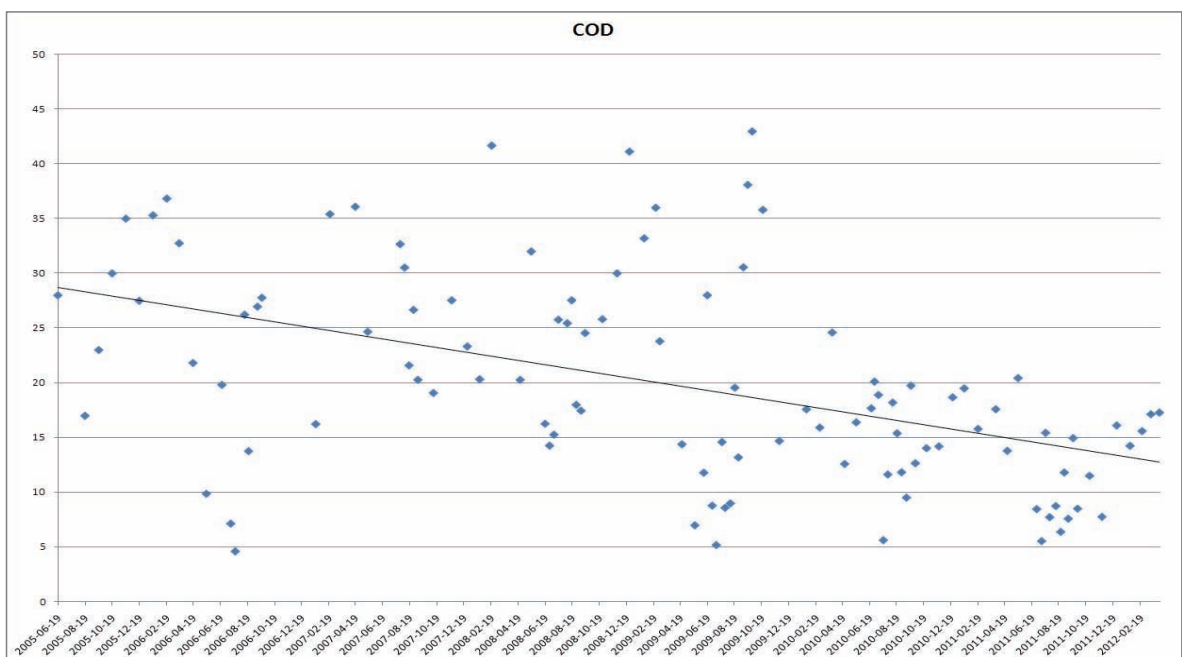


Figure 76. Changes in COD Concentration in Samho Stream (2005-2012)

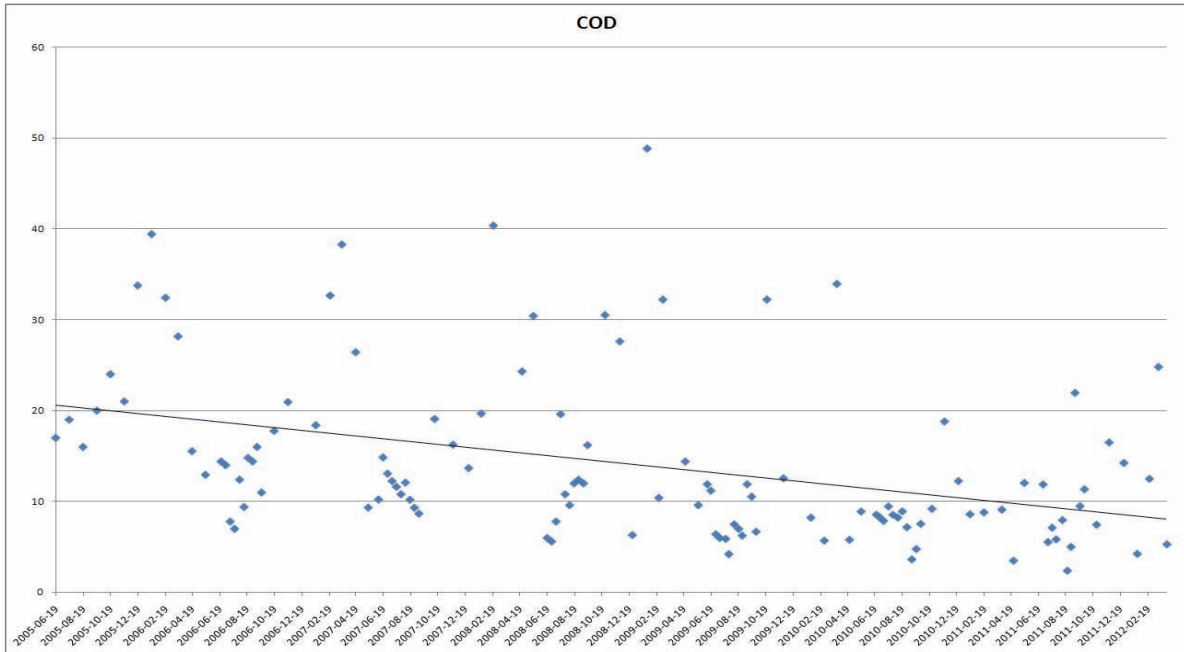


Figure 77. Changes in COD Concentration in Neadong Stream (2005-2012)

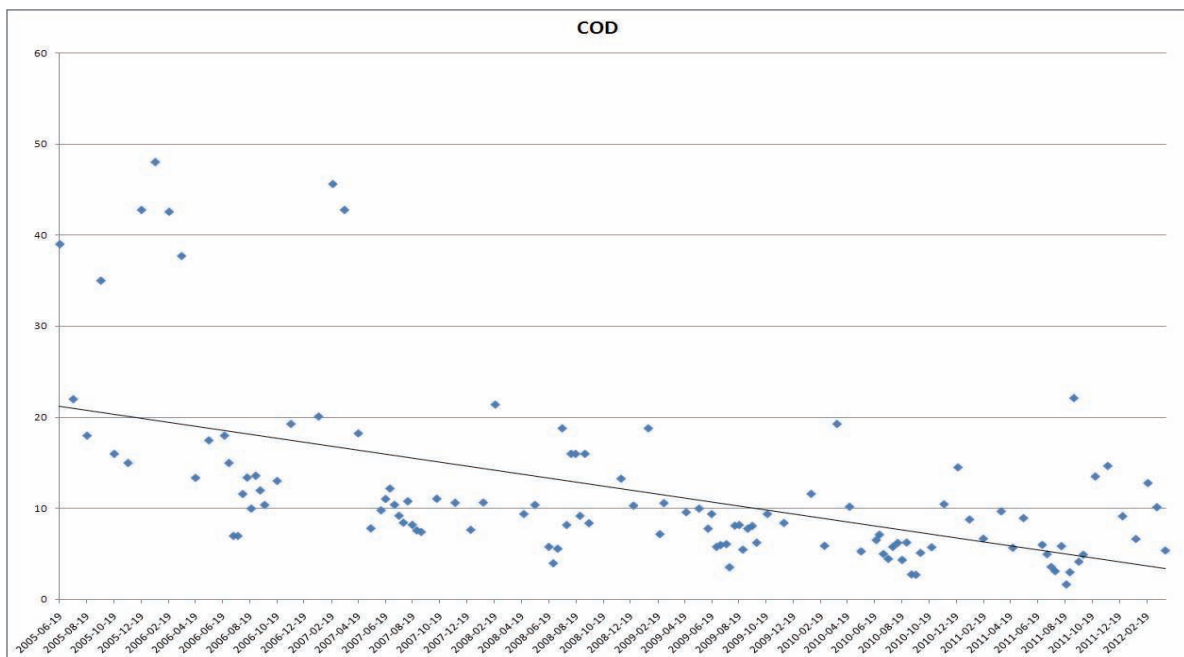


Figure 78. Changes in COD Concentration in Changwon Stream (2005-2012)

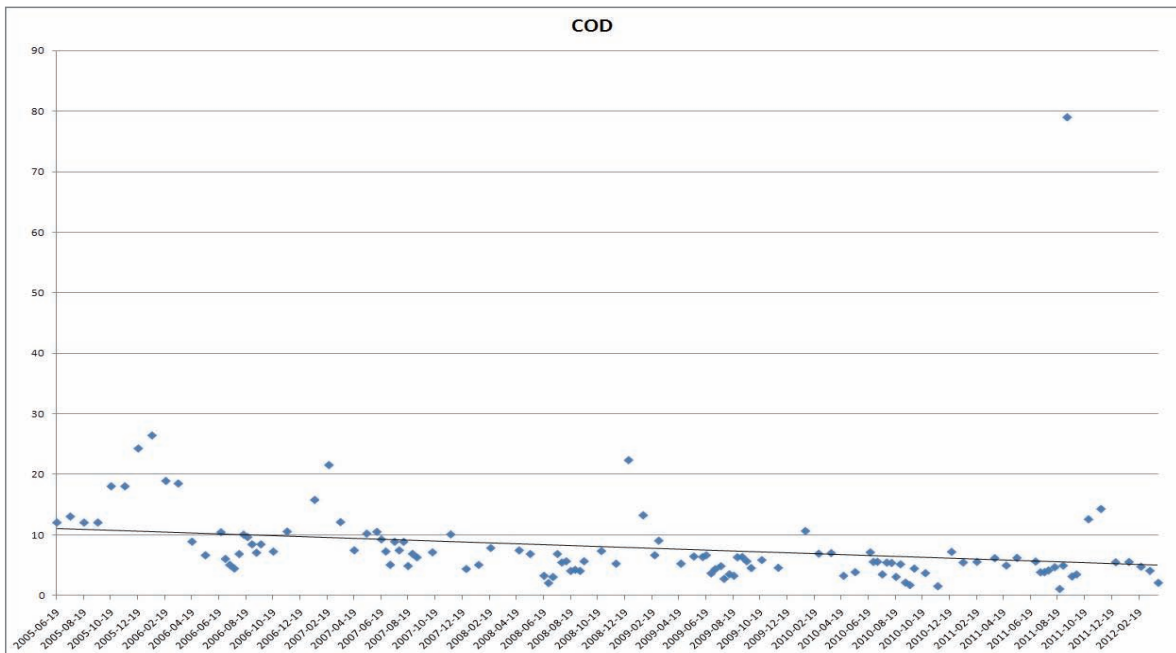


Figure 79. Changes in COD Concentration in Namchun Stream (2005-2012)

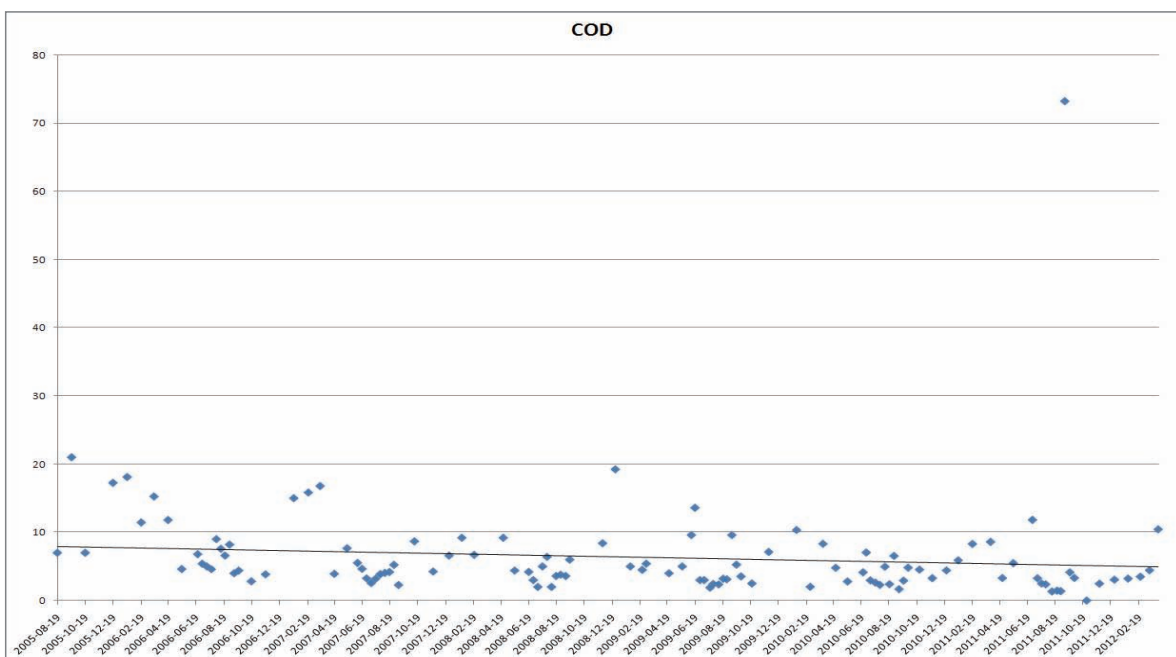


Figure 80. Changes in COD Concentration in Geajang Stream (2005-2012)

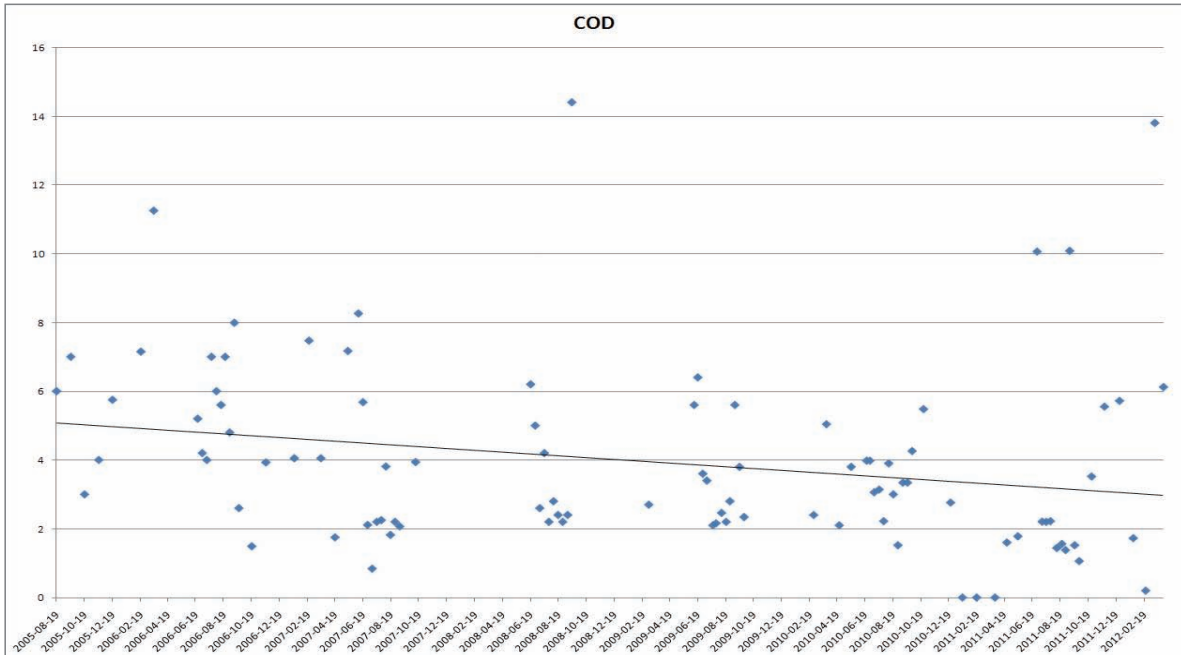


Figure 81. Changes in COD Concentration in Doodong Stream (2005-2012)

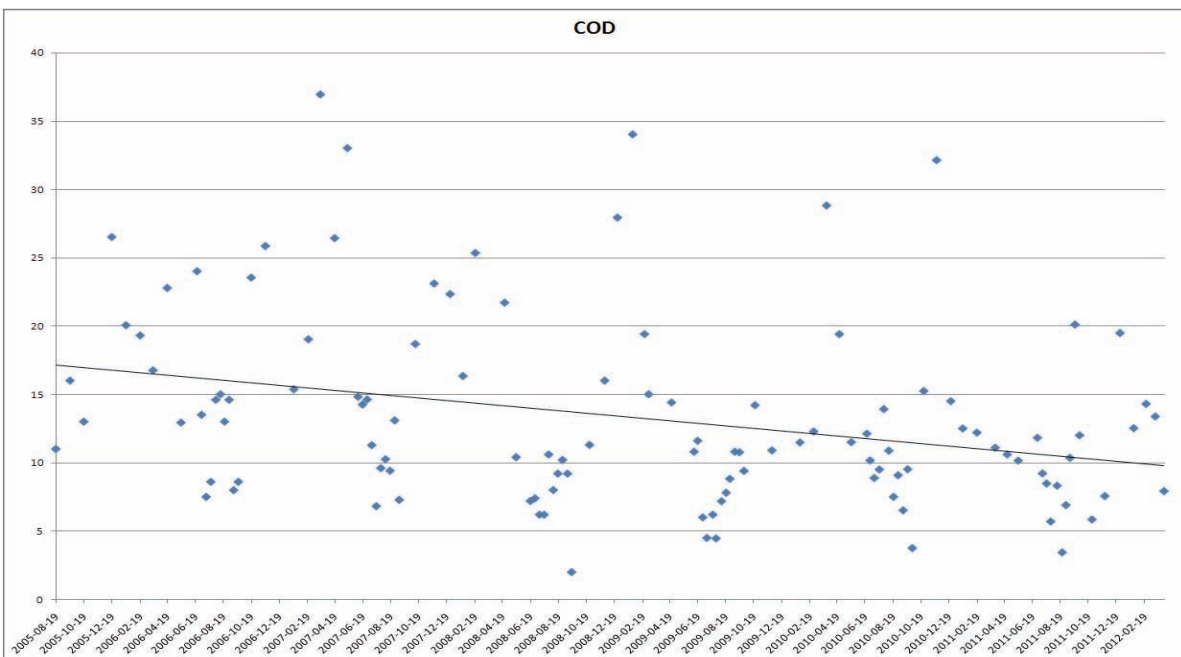


Figure 82. Changes in COD Concentration in Guee Stream (2005-2012)

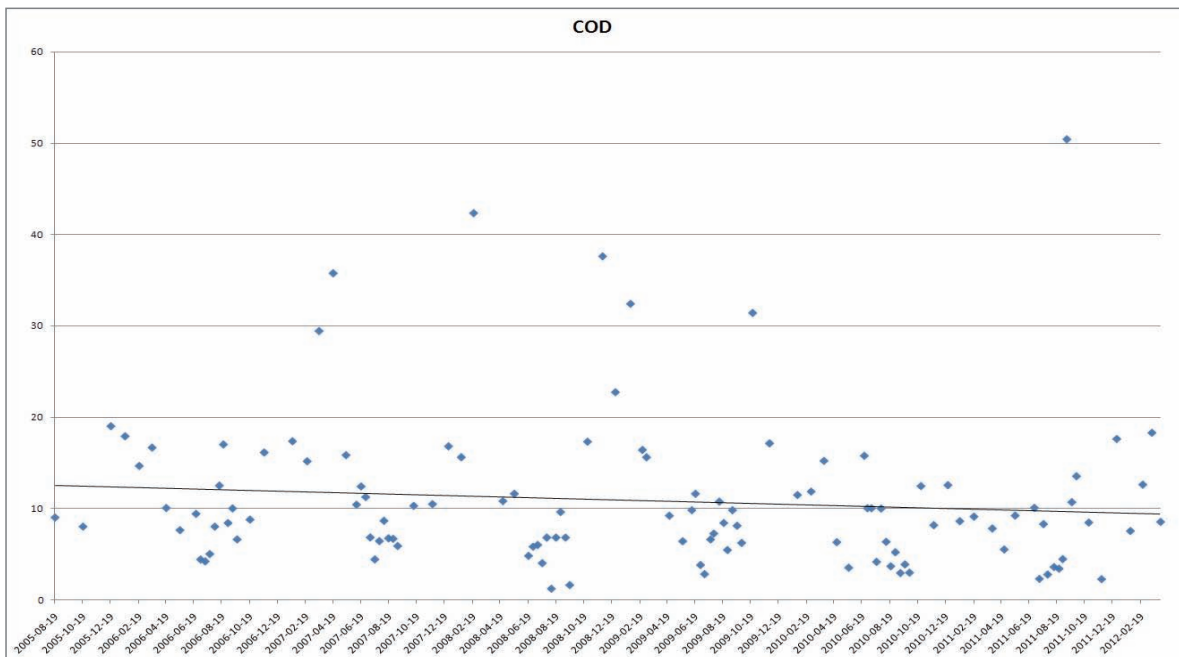


Figure 83. Changes in COD Concentration in Shunee Stream (2005-2012)

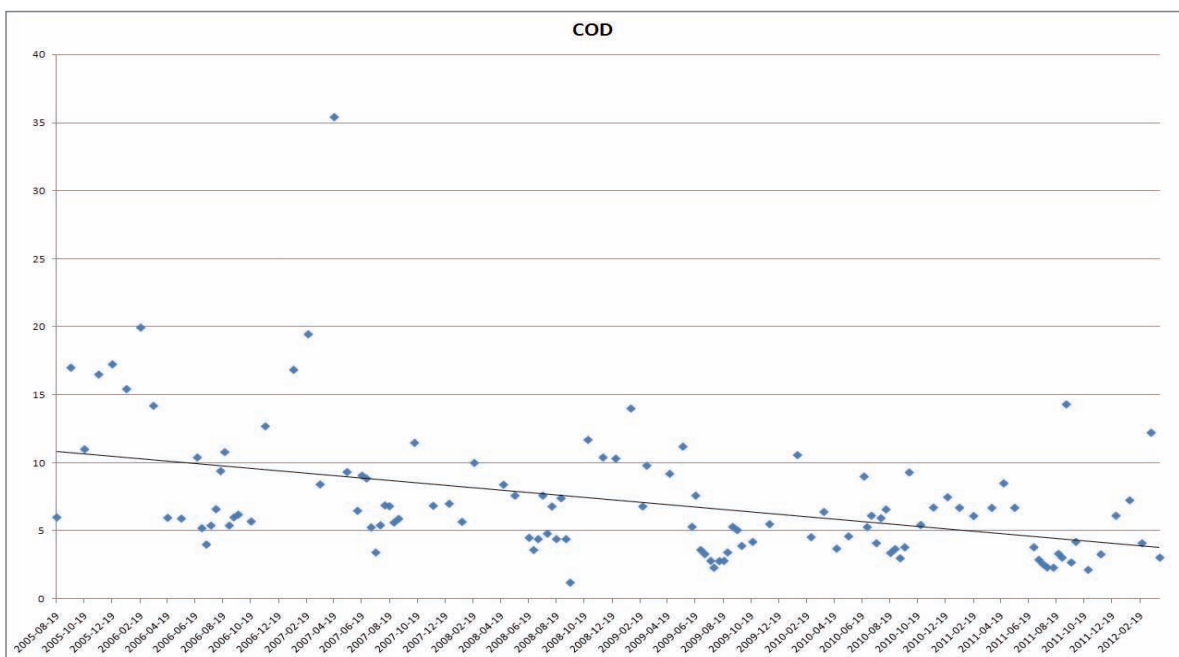


Figure 84. Changes in COD Concentration in Deachun Stream (2005-2012)

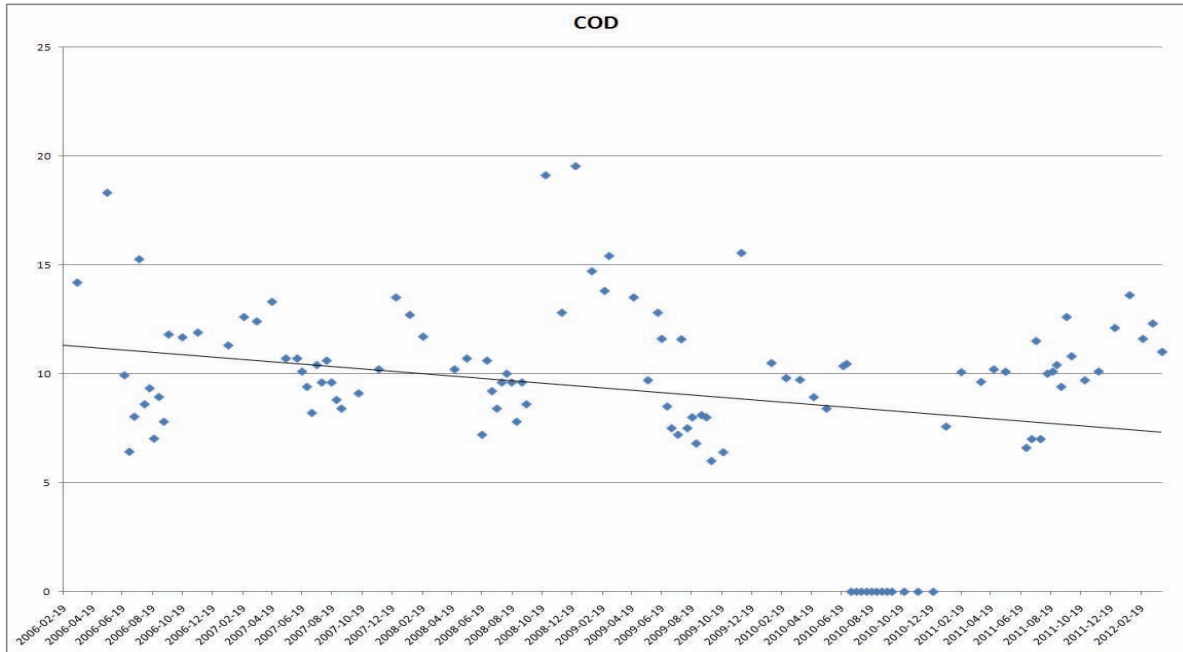


Figure 85. Changes in COD Concentration in Jinhea wastewater treatment plant (2005-2012)

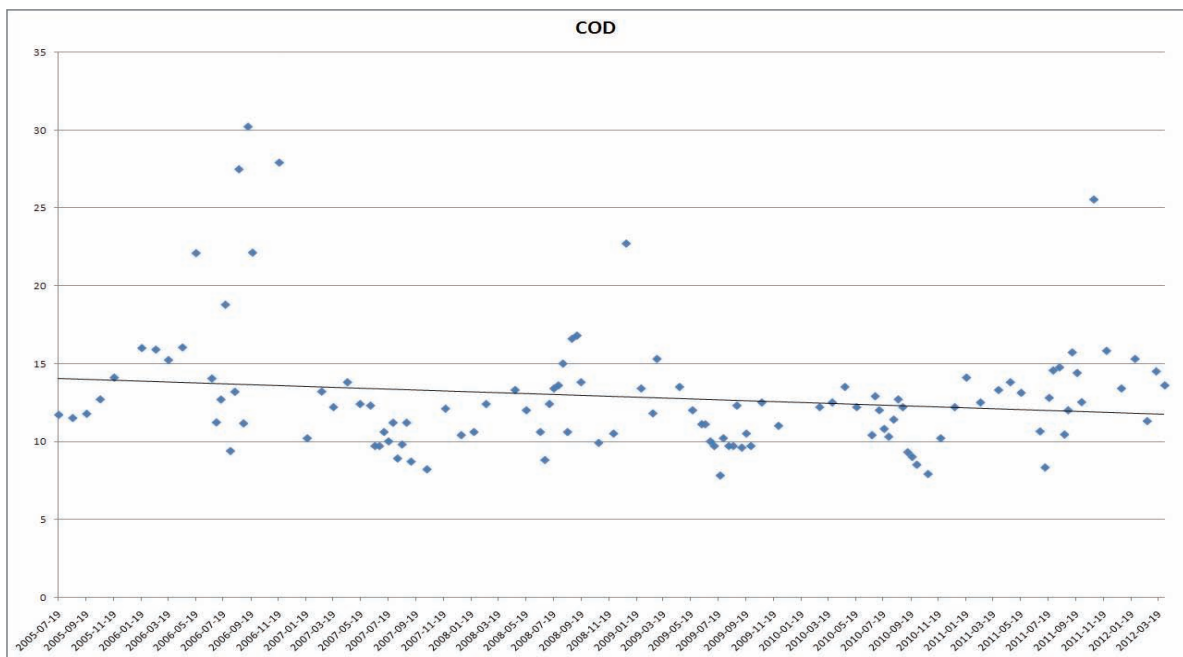




Figure 86. Changes in COD Concentration in Dukdong wastewater treatment plant (2005-2012)

SOC Code	Category	Indicator	State	Trend
032	Pollution and waste management	Air quality 대기질		

Description	This indicator reports on the quality of air in terms of total suspended particulates, sulfur oxide, nitrogen oxide, carbon oxide and volatile organic carbon
Rationale	Air pollution is harmful to human health and the quality of the environment.
Data requirements	<ul style="list-style-type: none"> • Changes in concentration of total suspended particulates (TSP) • Changes in concentration of other air pollutants (particulate matter, sulfur oxide, nitrogen oxide, carbon oxide, volatile organic carbon)
Guide Questions	<ol style="list-style-type: none"> 1. What changes are occurring in the levels of total suspended particulates (TSP), and other air pollutants? What are the trends over time? 2. What are the air quality standards/criteria for the area and different uses? Are these standards/criteria being met? What are the trends over time?
Results	<p>In order to improve air quality, major roads were cleaned by two vacuum road flushers and 185 natural gas-fueled buses were introduced among 254 local buses operating under the local government.</p> <p>Changwon citizens may use of Nubija service-4,630 bicycles are available for rent at 230 terminals in Changwon-with membership fee of KRW 20,000 per year. Currently there are approximately as many as 70,000 Nubija members and the number would continuously increase with the average number of 25,000 service users per day at the end of 2011.</p>



Table 23. Air Pollutant Emission in Changwon

Year	Sulfurous acid gas (SO ₂) (ppm/year)	Carbon monoxide (CO) (ppm/8hours)	Nitrogen dioxide (NO ₂) (ppm/year)	Dust ((μgm ³)/year)
1995	0.013	1.00	0.02	35.00
1996	0.013	0.70	0.02	38.00
1997	0.009	0.80	0.03	35.00
1998	0.011	0.80	0.02	36.00
1999	0.009	1.80	0.02	71.00
2000	0.006	0.50	0.02	37.00
2001	0.005	0.70	0.02	54.00
2002	0.006	0.60	0.02	56.00
2003	0.005	0.50	0.02	58.00
2004	0.006	0.60	0.02	61.00
2005	0.005	0.50	0.02	68.00
2006	0.005	0.50	0.02	52.00
2007	0.005	0.50	0.02	48.00
2008	0.004	0.50	0.02	45.00
2009	0.004	0.50	0.02	44.00
2010	0.005	0.50	0.03	42.00

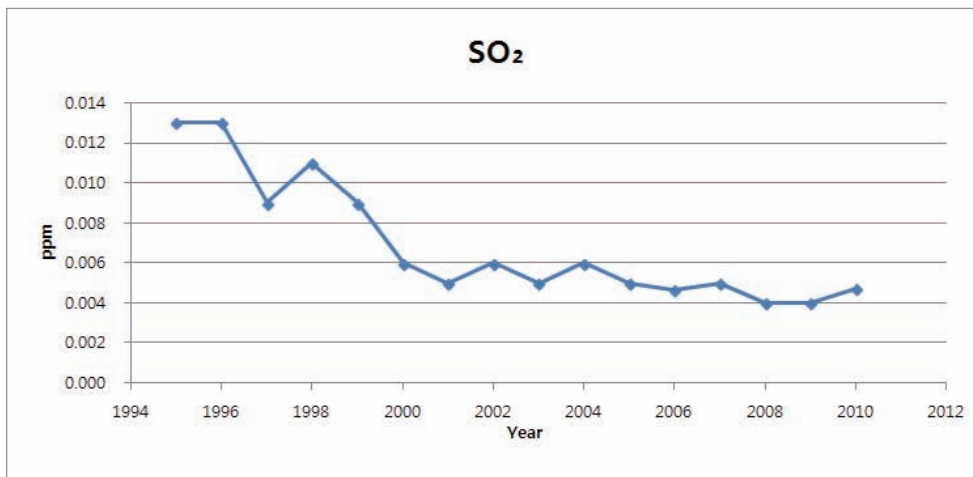


Figure 87. Air Pollutant Emission in Changwon(Sulfurous acid gas)

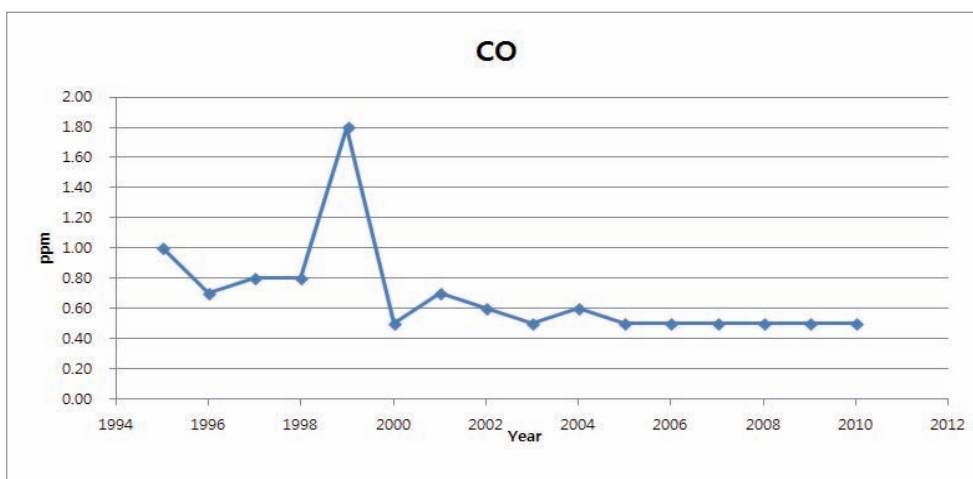


Figure 88. Air Pollutant Emission in Changwon(Carbon monoxide)

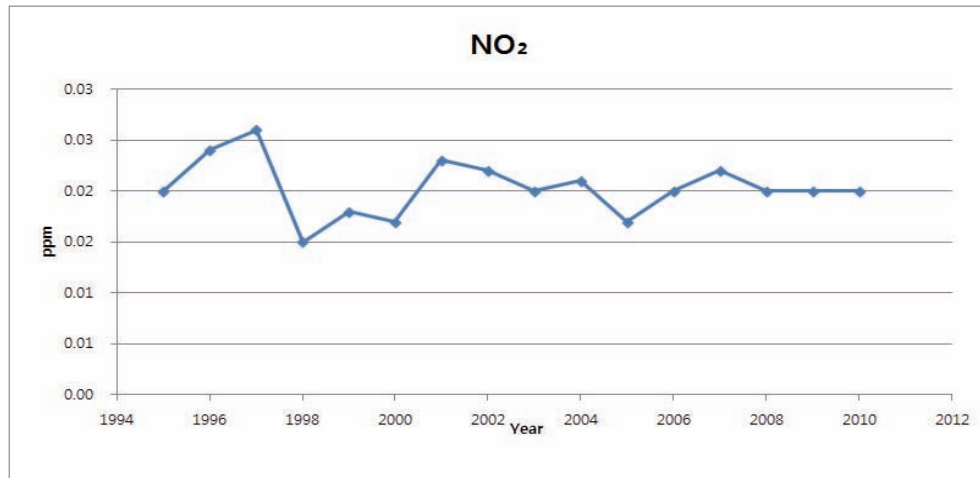


Figure 89. Air Pollutant Emission in Changwon(Nitrogen dioxide)



Figure 90. Road cleaning by road flusher



Figure 91. Natural gas-fueled bus in operation for air quality improvement



Figure 92. Use of bicycles for air quality improvement(NUBIJA)



SOC Code	Category	Indicator	State	Trend
033	Pollution and waste management	Sanitation and domestic sewerage 하수설비 및 생활하수		

Description	This indicator reports the proportion of population with access to sanitation and sewerage systems.
Rationale	The lack of sanitation facilities can affect human well-being and have negative impact on the quality of the environment especially when disposed untreated to the coastal and marine environment. Moreover, data on access to sanitation also monitors progress in meeting one of the Millennium Development Goals (MDG) targets for environmental sustainability.
Data requirements	<ul style="list-style-type: none"> • Population with access to improved sanitation • Households connected to septic tanks • Volume of septage collected/treated • Population served by public sewerage system (collection) • Location of sewage treatment plants and discharge pipes • Level of treatment and volume of sewage treated • Volume of domestic wastewater generated, treated, recycled or reused
Guide Questions	<ol style="list-style-type: none"> 1. What changes are occurring in the proportion of population having access to improved sanitation? What are the trends over time? 2. What is the proportion of households connected to septic tanks? What is the volume and proportion of septage collected and treated? 3. Is there an existing sewerage system/sewage treatment plant in the area? What is the proportion of population being served by the sewerage system? 4. Where is/are the sewage treatment plant(s) located? What are the treatment technology, the volume of sewage treated, and the design capacity/ies of the plant/s? How is the treated waste disposed? Where is the treated waste disposed? 5. What proportion of treated domestic wastewater is recycled or reused?
Results	Sewerage distribution rate in 2011: 94.6%

Table 24. Sewerage Population and Distribution rate

Administrative district (City/ County)		Total population	Total area (km ²)	Sewage treatment area [Population benefiting from sewage treatment] (total)	Sewage treatment area (area) km ²	Outer area of sewage treatment [population] (total)	Outer area of sewage treatment (area)	Sewerage distribution rate(%)
2005	Changwon City	427,119	329.7	392,197	70.4	34,922	259.3	91.8
	Masan City	508,499	292.65	461,315	125.37	47,184	167.28	90.7
	Jinhae City	158,624	112.76	141,179	14.63	17,445	98.13	89
2006	Changwon City	509,535	293	476,083	128	33,452	164	93
	Masan City	424,727	330	390,587	70	34,140	259	92
	Jinhae City	163,221	113	146,257	15	16,964	98	90
2007	Changwon City	510,120	292.65	476,890	133.38	33,230	159.27	93.4
	Masan City	419,251	329.7	389,773	70.4	29,478	259.3	92.9
	Jinhae City	165,252	113.9	151,421	14.66	13,831	99.24	91.6
2008	Changwon City	509,801	292.72	492,049	47	17,752	245.72	96.5
	Masan City	414,771	330.58	386,035	70.4	28,736	260.18	93.1
	Jinhae City	171,421	120.19	156,000	17.66	15,421	102.53	91
2009	Changwon City	508,984	292.74	492,159	204.75	16,825	87.99	96.6
	Masan City	409,776	330.57	381,151	105.8	28,625	224.77	93.0
	Jinhae City	173,911	113.86	159,620	14.66	14,291	99.2	91.7
2010	Changwon City	1,103,849	740	1,044,396	356	59,453	384	94.6



SOC Code	Category	Indicator	State	Trend
034	Pollution and waste management	Municipal solid waste 도시의 고품폐기물		

Description	This indicator measures the tonnage of solid waste generated, the proportion being recycled or reused and amount received in dumpsites or sanitary landfills.
Rationale	Uncontrolled waste handling and disposal impact negatively on human and ecological health as well as the aesthetic and recreational values of coastal areas.
Data requirements	<ul style="list-style-type: none"> • Volume of solid waste generated • Volume of solid waste received in landfills/dumpsites • Volume of solid waste received at recycling facilities
Guide Questions	<ol style="list-style-type: none"> 1. What changes have occurred in the number of dumpsites, landfills and recycling facilities in the area? What are the trends over time? 2. What trends are occurring in the volume of solid waste generated, received in landfills/dumpsites, and sent to recycling facilities?
Results	After announcing its aim to become an environmental capital in Korea, Changwon City has carried out solid wastes reduction projects including introduction of waste separation and address labelling system, food waste separation project and supply of incineration plant waste heat to companies in order to achieve 0% wastes and 100% recycling goal..

• Results and Recommendation

Table 25. Volume of solid waste received in landfills/dump site

Administrative district (City/ County)	in 2011				
	No. of sites	Area (㎡)	Total capacity of landfills (㎡)	Used capacity	Remaining available capacity
Changwon City	3	423,984	7,939,537	5,225,507	2,714,030

Meeting for public evaluation on collection and transportation of domestic wastes

Among many public services, cleaning service is the most closely related to public daily lives and the service is currently provided by cleaning-specialized subcontractors. Changwon

City involves citizens to assess cleaning service quality across the city in order to improve service quality and establish the foundation for stable disposal of domestic wastes.

- Assessment criteria and score allocation (conducted once a year during the second half of the year)
 - ⊙ Method (3 elements): residents satisfaction level, public assessment, performance reports
 - Score allocation (100 points)

Total	Residents satisfaction level (ARS, survey)	Public assessment (citizens, city council members, private specialists)	Performance reports (Public officials)	Note
100	30	40	30 (3)	Extra credits: 3

- 1) Residents satisfaction level: Survey on local residents regarding satisfaction level of collection and transportation service of domestic wastes
- 2) Public assessment: Objective and descriptive assessment on cleanliness of residential and commercial areas, garage, collection/transportation vehicles and resting rooms for street cleaners
- 3) Performance reports: Objective assessment based on documents covering the subcontractor's staff, equipment and safety management and compliance with cleaning related regulations

- Application of assessment results

Grade	Score	Application	
		During the contract period	Upon renewal (Average assessment score given during the contract period)
Excellent	90 or above	Financial rewards	Expansion of collection area
Good	80 - 89	Official commendation	Extention of contract period
Sastisfactory	70 - 79	–	Additional credits for bidding process
Not satisfactory	60 - 69	More strict monitoring and management	Downsizing of collection area
Poor	50 - 59	1 month suspension of business	<ul style="list-style-type: none"> • 1 business suspension: restrictions on bidding • More than 1 business suspension: termination of contract
Bad	Lower than 50	3 months suspension of business	<ul style="list-style-type: none"> • 1 business suspension: restrictions on bidding • More than 1 business suspension: termination of contract



Table 26. Assessment table for public evaluation on collection and transportation of domestic wastes.

Area for Assessment				Total score
Address (10 collecting points):				
Description	Score	Criteria	Assessment result (Indicate ○ if relevant)	
Completeness of collection	※ The following cases will <u>NOT</u> be classified Uncollected but the household may be held responsible: <ul style="list-style-type: none"> ▶ A small volume of wastes considered thrown after collection ▶ Wastes not packed in the prescribed plastic bags or complied with guidelines ▶ Waste items not listed on the subcontractor's collection agreement 			
	① Excellent (20)	All collection points are cleared		
	② Satisfactory (17)	One collection point remains not cleared		
	③ Not satisfactory (13)	Two collection points remain not cleared		
	④ Poor(10)	Three or more collection points remain not cleared		
Timeliness of collection	① Yes (5)	Wastes are collected on time		
	② No(0)	Wastes are not collected on time		
Comprehensive assessment	Satisfactory (1)~poor(0)	The above three categories are comprehensively assessed and graded by an evaluator (rounded to one decimal point)		

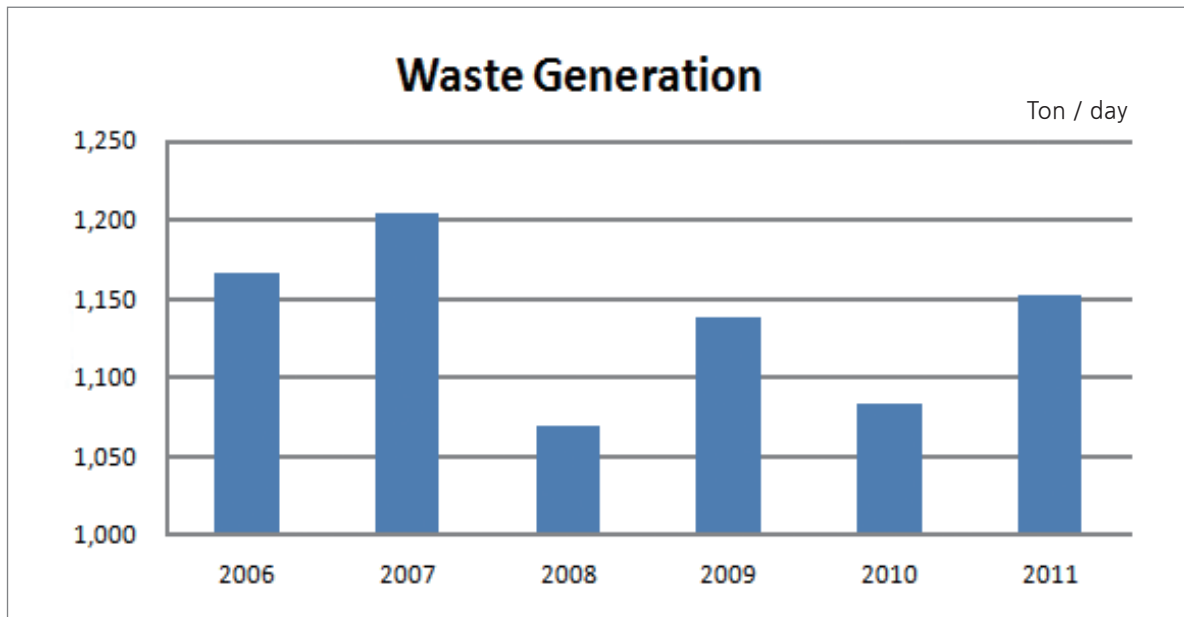


Figure 93. Change of Waste Generation in Changwon City

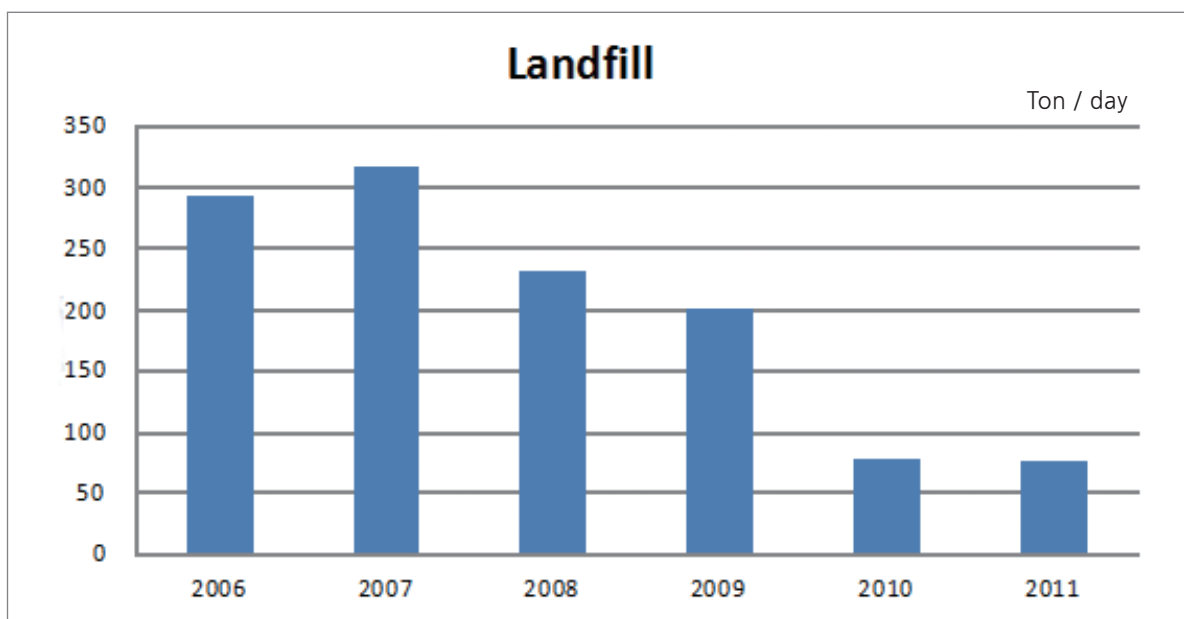


Figure 94. Change of Waste Landfill in Changwon City

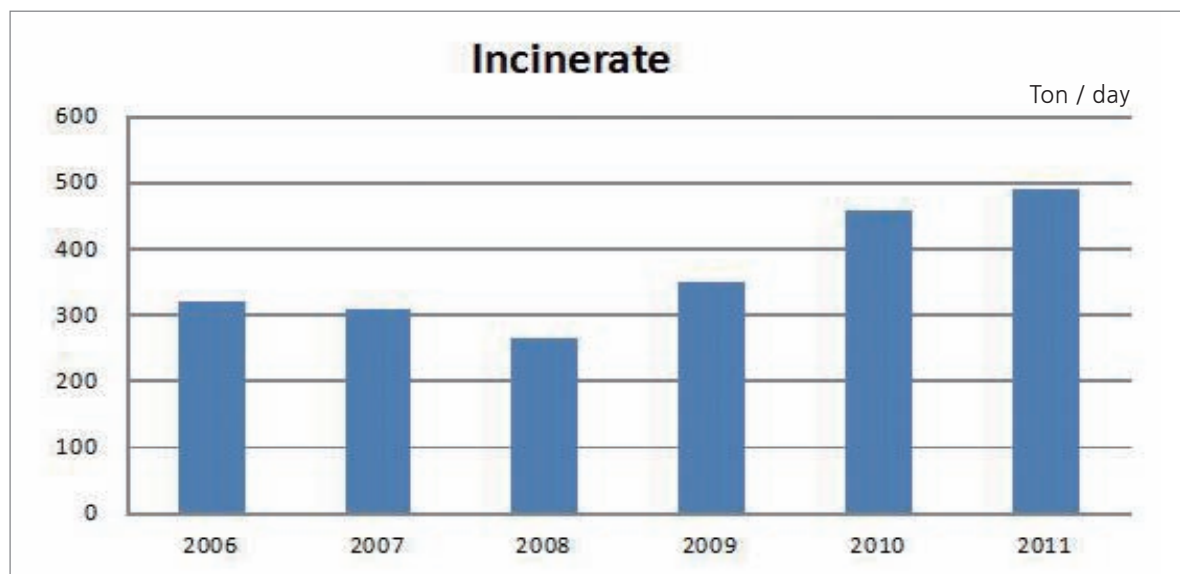


Figure 95. change of Waste Incineration in Changwon City

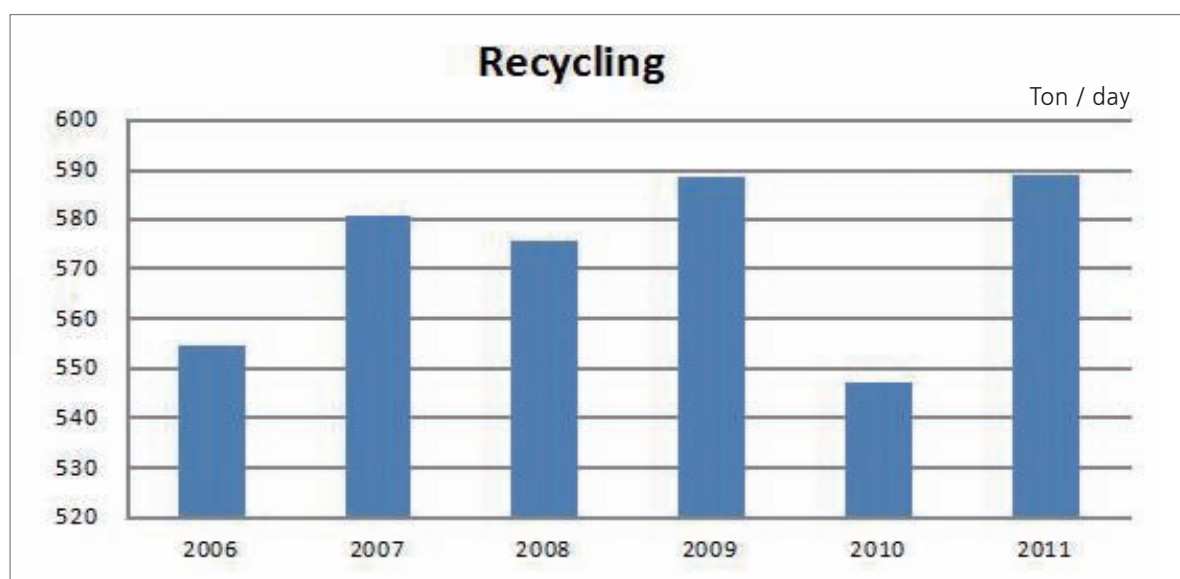




Figure 96. Change of Waste Recycling in Changwon City

Table 27. Waste Generation in Changwon City

(Unit: ton/day)

Year	Total Waste Generation	Landfill	Incinerate	Recycling
2006	1,167	292	320	554
2007	1,204	315	308	581
2008	1,069	232	262	575
2009	1,137	200	349	589
2010	1,082	77	458	547
2011	1,153	76	488	589

SOC Code	Category	Indicator	State	Trend
035	Pollution and waste management	Hazardous and toxic wastes 산업, 농업 폐기물 지정폐기물		

Description	This indicator measures the quantity of hazardous and toxic wastes being generated and properly managed within the local government's jurisdiction.
Rationale	Agricultural, commercial, institutional and industrial sectors generate income and employment but they also generate wastes that may affect human health and livelihoods in communities. Hazardous and toxic wastes (e.g., oily waste, pesticide residues; cleaning compounds; hospital wastes; etc.) are byproducts of various goods, services, processes and systems that customers/citizens demand. The proper management of these wastes is a major challenge to local governments and to sustainable development.
Data requirements	<ul style="list-style-type: none"> • Volume of hazardous and toxic waste generated, handled, treated and disposed
Guide Questions	<ol style="list-style-type: none"> 1. What trends are occurring with regard to the quantities of industrial, agricultural, and toxic hazardous waste being generated in the area? 2. What proportion of these wastes are handled, treated and disposed in accordance with local and/or national laws? <p>What are the trends over time?</p>
Results	<ul style="list-style-type: none"> • Changwon city has begun working to lay the foundations for an exemplary environment friendly and “green” city by creating the Green industry consultative committee. The committee is composed of representatives or officials from 130 businesses, including those that are working on programs to reduce or recycle waste. It aims to maximize the reduction and recycling of waste through cooperation between companies and the municipal government. The panel will summon its members once a month to discuss ways of not only reducing wastes but also making them resources through recycling. At present, Changwon's recycling rate stands at 76.7 %. The city plans to increase the rate to 85% in 2015 and 90% in 2020. If the goal is attained, the city could save about 10 billion won supposed to be used to dispose of wastes per year. • Toxic wastes were specially classified and treated by the law.





Figure 97. Industrial Waste Electronic Commerce System in Changwon city

http://app.yonhapnews.co.kr/YNA/Basic/article/Press/YIBW_showPress.aspx?contents_id= RPR20110525026200353

Table 28. Generation, Treat and Disposal of Industrial wastes in Changwon city

Unit: ton

Year	Industrial wastes				
	Generation	Landfill	Incineration	Recycling	Others
2010	2,552	434 (17%)	132 (5%)	1,964 (77%)	23 (1%)
2011	2,811	378 (13%)	110 (4%)	2,249 (80%)	74 (3%)
Year	Construction wastes				
	Generation	Landfill	Incineration	Recycling	Others
2010	1,021,722	73 (0%)	2,211 (0.2%)	1,019,438 (99.8%)	- (0%)
2011	1,633,295	546 (0%)	16,698 (1%)	1,616,051 (99%)	- (0%)
Year	Hazardous wastes				
	Generation	Landfill	Incineration	Recycling	custody
2010	110,746	17,821 (16%)	25,079 (23%)	66,622 (60%)	1,224 (1%)
2011	18,815	6,983 (37%)	4,765 (25%)	6,669 (35%)	398 (2%)

Table 29. Status of municipal waste Generation and treatment in Changwon city

	Generation	treatment	Total Waste Generatiwon	meter- rate system garbage bag	Combustible- Wastes	Non Combustible- Wastes	Recycling	Food Waste Generation
2006	Generation		1167	642.5	587.7	54.8	317.5	207
	Treatment	Landfil	292.4	291.2	236.4	54.8	1.2	0
		Incinerate	320.4	318.4	318.4	0	2	0
		Recycling	554.2	32.9	32.9	0	314.3	207
2007	Generation		1203.67	624.47	550.4	74.07	313.5	265.7
	Treatment	Landfil	315.3	315.3	241.4	73.9	0	0
		Incinerate	307.6	307.6	307.6	0	0	0
		Recycling	580.77	1.57	1.4	0.17	313.5	265.7
2008	Generation		1069.282767	501.2	441.1	60.1	317.582767	250.5
	Treatment	Landfil	231.5	231.5	173.5	58	0	0
		Incinerate	262.3	262.3	262.3	0	0	0
		Recycling	575.4827671	7.4	5.3	2.1	317.582767	250.5
2009	Generation		1137.4	548.7	468.8	79.9	313.7	275
	Treatment	Landfil	200	200	139.6	60.4	0	0
		Incinerate	348.7	348.7	329.2	19.5	0	0
		Recycling	588.7 0	0	0	0	313.7	275
2010	Generation		1199.6	606.2	525.5	80.7	326.1	267.3
	Treatment	Landfil	90.3	90.3	29.9	60.4	0	0
		Incinerate	476.5	476.5	460.8	15.7	0	0
		Recycling	632.8	39.4	34.8	4.6	326.1	267.3



2012 STATE OF THE COASTS OF MASANBAY



This report was prepared by the Coastal Resources and Environmental Research Center for Changwon Municipal Government, Gyeongnam Province, South Korea.

For bibliographical purposes,
this document may be cited as:
Chan Won Lee, Hong Pyo Jeon, Sung Jin Lee,
Seon Young Lee, Yong Chang Jang.
(2012). State of the Coasts of Masan Bay,
Coastal Resources and Environmental Research Center,
Changwon, South Korea.



Contacts:

Dr. Chan Won Lee

Email: water@kyungnam.ac.kr

Telephone No: +82-55-249-2992

Postal Address: (P.631-701) Coastal Resources and Environmental Research Center, the Second Building of Natural Science, Kyungnam University, 449 Woryoung-dong, Masanhapo-ku, Changwon City, Gyeongnam Province, South Korea.

