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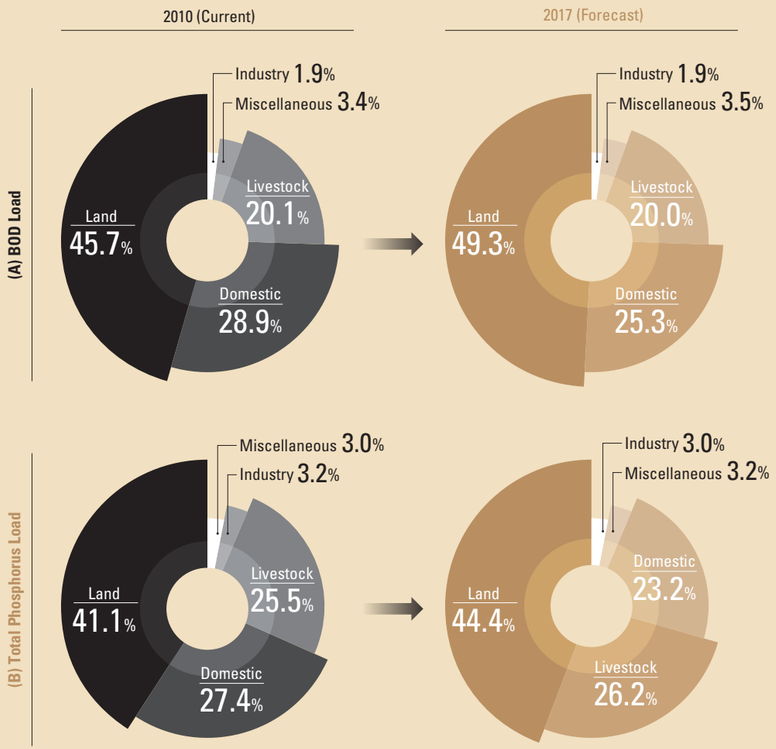
Roles and Responsibilities of Landowners or Occupiers to Effectively Manage Non-point Source Pollution

By 2020, non-point source is expected to contribute up to 72% of the biochemical oxygen demand load in the national water system. Failing to manage the non-point source pollution will indisputably impair water quality. This research has explored ways to assign the appropriate level of responsibility to landowners and occupiers to increase effectiveness of non-point source pollution management policy.

FIGURE 1 PRESENT (2010) AND FUTURE (2017) CONTRIBUTION OF MAJOR CATEGORIES TO THE POLLUTION DISCHARGE LOADING ((A) BIOCHEMICAL OXYGEN DEMAND, (B) TOTAL PHOSPHORUS)



Reconstructed from 2013 Ministry of Environment Research on Setting the Policy Direction for Condition Changes of Water Environment Management

NON-POINT SOURCE

72%

BY 2020, NON-POINT SOURCE IS EXPECTED TO CONTRIBUTE UP TO 72% OF THE BIOCHEMICAL OXYGEN DEMAND (BOD) LOAD IN THE NATIONAL WATER SYSTEM.

By 2020, non-point source is expected to contribute up to 72% of the biochemical oxygen demand (BOD) load in the national water system. Of the total pollution discharge load from both point and non-point sources, the pollution discharge load from land takes up a large proportion. The pollution discharge load from domestic and industry sectors are expected to decrease, while land and livestock sectors are expected to form larger proportions in the future (Figure 1). Especially, occurrences of non-point source (NPS) pollution from land category such as sites, road, etc. will continue to increase.

Since the first "Comprehensive Non-point Source Control Policy" in 2004, the Korean government has actively implemented various policy measures to control NPS pollutions. NPS control facility installation reporting system was introduced in 2006, NPS designation of management area, which eventually formed the framework for the current management system, was introduced in 2007, and various researches on long term monitoring of discharges and expanding the installation reporting system were carried out. Various projects were completed as a result of the first Comprehensive NPS Control Policy, and various facilities for controlling NPS pollution were installed in different parts of the infrastructure such as sewer treatment works, road maintenance and urban parks and green spaces. A timeline showing the development of NPS management in Korea can be seen in Figure 2.

Based on the aforementioned progress, the second Comprehensive NPS Control Policy was published in 2012. It shifted the original aims to reducing stormwater runoff by restoring the natural water cycle, minimizing NPS pollutions through integrated river basin management, and encouraging public participation and active NPS pollution management. The main changes in the detailed strategy include:

1. Policy shift from runoff concentration control to runoff minimization
2. Preferential preventive management rather than the post treatment
3. Integrated management rather than individual management
4. Increased public relation activities with the public, businesses and governments

Overall, it emphasizes the importance of stormwater pollution prevention from the source. Such source control policy can be highly sensitive because it may affect the land use and the land-use activities. In order to enhance the NPS control efficiency, this study investigated potential roles and responsibilities of landowners or occupiers

FIGURE 2 PROGRESS OF NON-POINT SOURCE POLLUTION MANAGEMENT SYSTEM AND RELATED PROJECTS

2001
Start of muddy water improvement project (2001)

2004
First Comprehensive Non-point Source Control Policy (2004 Mar)
Non-point source pollution reduction system pilot project (2004~)

2005
Imha Dam turbid water reduction measures (2005 Jan)

2006
Non-point source control facility installation reporting system (2006 Apr)
Doam Dam water quality improvement measures (2006 Nov)

2007
Designation of non-point source management area (2007 Aug)
Long-term monitoring study of major non-point sources (2007)
Soyang River Dam turbid water reduction measures (2007 Mar)
Environment-friendly road construction guidelines (2007)
Expansion of non-point source installation reporting system (2007 Nov)

2008
Subsidy to local government on NPS mitigation projects (2008~)
Management of spraying livestock manure liquefied fertilizers on farmlands (2008 Mar)
Installation of soil erosion mitigation facility in farmland infrastructure maintenance project (2008)

2009
Revision of Sewer Maintenance Guidelines (2009 Dec)
- Development of operation manual for controlling the first flush of stormwater pollution at sewer treatment plants (2009 Dec)

2010
Environment-friendly Road Maintenance Management Guideline (2010)
- Legal basis for controlling NPS pollution and installing NPS mitigation facilities

2011
Amendment of enforcement rules on laws related to urban parks and green spaces (2011 Aug)
- Expansion of stormwater runoff detention units at urban parks and green spaces

2012
Second Comprehensive Non-point Source Control Policy (2012 May)

appropriate for managing NPS pollutions.

In order to assign the responsibilities of landowners or users for the NPS control from the source, this study reviewed the liability on facilities (Anlagenhaftung) and that of the acts (Handlungshaftung). In terms of the facility liability, stricter responsibility can be imposed to the facilities when storing or using fertilizers, agricultural chemicals, livestock manure, industrial raw materials, hazardous chemicals, etc. In terms of the act liability, the landowners or occupiers need to understand that even ordinary land-use activities can significantly generate NPS pollution. Still, the command-control regulation on the land-use activities may raise social resistance to the environmental policy. Hence, the incentive-based programs which support the behavioral change of land users would be more socially acceptable.

There are difficulties of setting up a NPS pollution management regime. The NPS pollutions can occur from multiple sites, and various factors including weather conditions can affect the discharge of the NPS. Furthermore, the NPS pollution which was discharged and accumulated in the past may influence the present water quality. It is also difficult to understand the effects of NPS on water quality because of its exposure to ever-changing environment. Another question that needs to be addressed is the technical difficulties of measuring inflow rate of NPS pollution into water bodies. Therefore, conventional point source (PS) control measures such as effluent limits are inadequate in managing the NPS.

Table 1 shows current policy measures implemented in agricultural sector to manage NPS pollution. In the agricultural sector, it is necessary to strengthen the responsibility of using pesticides and fertilizers. The assistance to the environment-friendly farming should be expanded, and the cross-compliance should be required from the applicants. More specifically, following measures are suggested for the agricultural NPS control:

i) establishing a code of good agricultural practice
ii) strengthening the current obligations on agricultural activities
iii) improving the agricultural subsidy system and applying cross-compliance
iv) setting up tighter inspection and penalty measures.

Current codes of agricultural practice such as Hazard Analysis and Critical Control Points (HACCP) focus on the quality of agricultural products and do not cover the environmental impacts of agricultural activities. Therefore, current codes should be revised to include the essential farming activities for the environmental protection. The revised code can be used as the minimum requirement for the environment-friendly farming subsidy.

Table 2 shows current policy measures for managing NPS pollution and stormwater runoff in urban areas. In the urban sector, it is necessary to expand the policy perspective from the NPS pollutants to stormwater runoffs. Higher responsibility of the stormwater control can be imposed to the land or buildings owned by the public sector. The ownership and the operation and maintenance (O&M) of low impact development (LID) facilities or green stormwater infrastructures (GSI) should be clarified. The urban stormwater policy measures are proposed as follows:

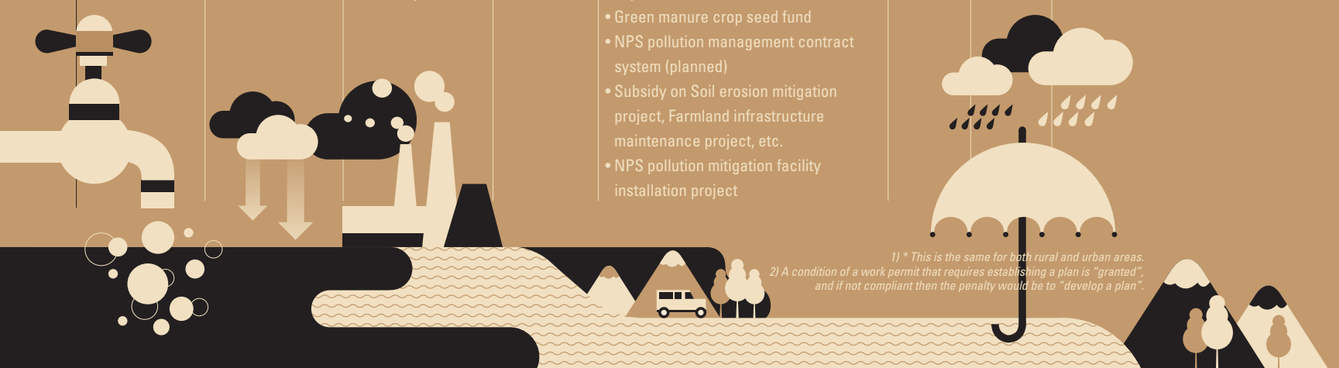
i) revising current urban stormwater regulations
ii) imposing the stormwater management responsibility on the public land
iii) reverting the LID facilities or GSI located within the sewer drainage area to the sewer authorities
iv) adopting a stormwater utility fee system.

Because the mandatory retrofit requirement of impervious areas in private properties can generate legal disputes, the public sector should play a leading role. In order to clarify the O&M responsibility of the constructed LID or GSI, it is necessary to define the LID/GSI located within the sewer drainage area as a sewer system. And the sewer authorities would need to participate from the early stages of LID/GSI planning, design and construction. Compared with current funding sources and general revenue, the stormwater utility fee system is regarded as more stable and equitable funding mechanism. Moreover, the stormwater utility fee system can provide a strong monetary incentive for stormwater runoff mitigation measures.

As the contribution of NPS to the water pollution exceeds that of PS and keeps increasing, more effective management of NPS is needed. Change in land-use activities via command-control regulations or economic incentive policies can significantly reduce the NPS discharge. In the short-term, stricter regulation can be enforced on the relatively distinct NPS polluter. Then, it is necessary to investigate innovative NPS management policies such as a farm subsidy linked to NPS control and stormwater utility fee.

TABLE 1 POLICY MEASURES FOR MANAGING NPS POLLUTION IN AGRICULTURAL AREA

REGULATION MEASURES				SUPPORT MEASURES			VOLUNTARY PROGRAM
Planning	**Protected Areas**	**Controlled Activities & Work Permits**	**Financial Burden**	**Economic Support**	**Technical Support**	**Integrated support**	
Total Water Pollution Load Management System*	Designation of NPS management area*	Ban on discharge of mass soil erosion to public water Farmland diversion permit system (farmland improvement & diversion permit)	Farmland Conservation Charge	• Soil amendment subsidy • Organic fertilizer support grant • Direct payment for environment-friendly agricultural practices • Wide-area environment-friendly agricultural complex construction cost • Cattle waste treatment facility fund • Irrigation water quality improvement fund • Green manure crop seed fund • NPS pollution management contract system (planned) • Subsidy on Soil erosion mitigation project, Farmland infrastructure maintenance project, etc. • NPS pollution mitigation facility installation project			Save the field ridges campaign (Gangwon province)



*1) * This is the same for both rural and urban areas.*
2) A condition of a work permit that requires establishing a plan is "granted", and if not compliant then the penalty would be to "develop a plan".

TABLE 2 POLICY MEASURES FOR MANAGING NPS POLLUTION AND RAINFALL EFFLUENT IN URBAN AREA

SYSTEM	TARGETS	DETAILS
NPS Control Facility Installation Reporting System	• Development projects subject to Environmental Impact Assessment (EIA) • Wastewater discharging facility (Over 10,000m^2 in area)	• Installation of NPS pollution control facility and compulsory change reporting system • NPS reduction planning and implementation
Total Water Pollution Load Management System	Area development projects	Allocation of pollution load reduction to NPS control facility
Ratio of Ecological Area	Development projects subject to EIA	Recommend a requirement of including ecological areas in land planning stage and objective setting stage
Prior Review System on Disaster Impacts	Administration Plan (14 areas) and development projects (10 areas)	• Evaluate flood risk • Evaluate possibility of implementing a rainfall runoff reduction plan
Obligation to Incorporate Stormwater Runoff Mitigation Facility	• Development site area over 2,000m^2 in area • Public facilities such as schools, parks, car parks, etc.	Rainfall runoff reduction plan establishment and installation of rainfall runoff reduction facility
Sustainable New City Planning Code	Development of new cities	Emphasis on securing water permeability and green space
Rules on Urban Planning System Decision Making and Structure and Installation Standards	City infrastructure (roads, parks, rivers, etc.)	• Permeable pavement • Installation of rainwater infiltration and retention facilities
Guidelines on riverfront development	Construction projects in floodplains	Encourage application of LID (Decentralized stromwater management, rainwater harvest & reuse, etc.)