

A Curious Case: North Korea and the United Nations Framework Convention on Climate Change

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Abstract

This paper argues that North Korea is a willing participant in the United Nations Framework Convention on Climate Change, despite its reputation as a belligerent actor in nuclear diplomacy. Because of its vulnerability to climate change impacts, North Korea therefore has strong incentives to participate in the UNFCCC. North Korea represents a fascinating anomaly within the UNFCCC. It is not an active member of any specific negotiating bloc and has been an infrequent attendee at UNFCCC Conference of Parties gatherings. While North Korea may be an outlier in terms of its importance to the negotiating process of the Convention, there are dimensions of its interaction with the international climate change regime that are unique among signatories and worthy of scholarly attention. This study analyses North Korea's compliance with its commitments under Article 4.1 of the UNFCCC, drawing on information from reporting documents for the UNFCCC and the related *United Nations Convention on Biological Diversity* (UNCBD) and the *United Nations Convention to Combat Desertification* (UNCCD), along with project reports compiled by international organisations and NGOs working in the DPRK, and official statements released by the North Korean government. The paper concludes that North Korea is complying with its commitments as a Non-Annex I Party to the UNFCCC, because the objectives of the international climate change regime are congruent with the legitimacy and survival imperatives of the Kim government.

Introduction

North Korea is a willing participant in the United Nations Framework Convention on Climate Change (UNFCCC), despite its reputation as a belligerent actor in nuclear diplomacy. Because of its vulnerability to climate change impacts, North Korea has strong incentives to participate in the UNFCCC. North Korea represents a fascinating anomaly within the UNFCCC. It is not an active member of any specific negotiating bloc and has been an infrequent attendee at UNFCCC Conference of Parties gatherings. While North Korea may be an outlier in terms of its importance to the negotiating process of the Convention, there are dimensions of its interaction with the international climate change regime that are unique among signatories and worthy of scholarly attention.

The UNFCCC is a treaty framework of non-binding soft law commitments and guiding principles aimed at the long-term objective of solidifying national emissions reduction commitments into binding international law. It provides a framework for the development of binding greenhouse gas emission limits and adaptation strategies, while the later *Kyoto Protocol* contained specific provisions and regulations further codifying obligations for signatory Parties (Vihma, 2011). The Convention divides signatory countries into three main groups: *Annex I Parties*, which include the industrialized countries that were members of the OECD in 1992, plus countries of the former Soviet Union designated as ‘economies in transition’; *Annex II Parties*, comprising the OECD members of Annex I, but not the economies-in-transition’ countries; and *Non-Annex I Parties*, inclusive of developing countries or countries recognized as especially vulnerable to climate change impacts. North Korea is a Non-Annex I Party to the UNFCCC (Yamin and Depledge, 2004).

This study analyses North Korea’s compliance with its commitments under Article 4.1 of the UNFCCC, drawing on information from reporting documents for the UNFCCC and the related *United Nations Convention on Biological Diversity* (UNCBD) and the *United Nations Convention to Combat Desertification* (UNCCD), along with project reports compiled by international organisations and NGOs working in the DPRK, and official statements released by the North Korean government. It aims to document the DPRK’s compliance with its obligations as a Non-Annex I Party under UNFCCC as enunciated in Articles 4.1 of the Convention. It begins with a précis of academic scholarship on climate change and the environment in the North Korean context, establishing the link between climate change and state survival. It identifies North Korea’s obligations as a Non-Annex I Party to the UNFCCC and explores its compliance with the measures listed under Article 4.1. The paper concludes that North Korea is complying with its commitments as a Non-Annex I Party to the UNFCCC, because the objectives of the international climate change regime are congruent with the legitimacy and survival imperatives of the Kim government.

While North Korea may be peripheral to the negotiating process of the Convention, there are dimensions of its interaction with the international climate change regime that are unique and worthy of scholarly attention. Climate-related policy-making in Pyongyang is a product of the distinctive political, economic and ideological system centred on the Kim family dictatorship, which preferentially resources the military under the Songun politics model (Ri 2012) and bases policy on the ever-malleable philosophy of *Juche* (Yang 1994; McEachern 2010). Domestic governance is highly vertically stratified, characterised by centralised decision-making, ideological incentives and pervasive social and information controls (Cumings 2004; Lankov 2007). The national economy is hampered by structural inefficiencies, technologically antiquated infrastructure, and resource shortages. Its energy infrastructure is inefficient and heavily coal-dependent, based on aging Cold War-era technology that is desperately in need of upgrading and repairs (von Hippel and Hayes 2011). These capability constraints influence North Korea’s mitigation and adaptation strategies. This paper therefore sheds light on the interplay between domestic governance, UNFCCC treaty obligations and national disaster preparedness.

The disastrous Arduous March period of the mid-1990s provides a gateway for discussion of the climate-environment-governance nexus. Habib (2010) and Woo-Cumings (2002) argued that environmental impacts can have significant socio-economic and political consequences in a country like North Korea where state stability has been an ongoing question for over two decades. Climate change impacts—declining availability of food, water and energy, sea level rise, migration, and extreme weather events—are stress multipliers for countries already at risk from internal instability and economic weakness (Barnett, 2003; Dupont, 2008). Climate hazards will cause the greatest harm in combination with existing problems such as over-population, demographic imbalance, poor governance, endemic poverty and lack of infrastructure. Weak countries like North Korea, where such problems are endemic, will be the least able to cope (Campbell and Parthemore, 2008). The main dangers to the DPRK state from climate change will derive from the erosion of the state itself. The climate-related issues of energy and food insecurity, which brought the country to its knees during the Arduous March period, are central to this threat. North Korea therefore has a strong incentive to mitigate climate change to counteract its potentially destabilising impacts on Kim dynasty rule.

UNFCCC Compliance

Article 12.1 of UNFCCC requires all Parties to provide “a general description of steps taken or envisaged” to fulfil the commitments mandated across Article 4.1, in addition to providing a national greenhouse gas inventory in their national communications. The other commitments under Article 4.1 relate to national climate change mitigation and adaptation strategies and the incorporation of climate change into domestic policy-making processes, along with international cooperation on scientific exchange, knowledge and technology transfer, and implementation of adaptation responses. The following sections document North Korean engagement and compliance with these articles.

We can construct a portrait of North Korea’s UNFCCC interactions by triangulating available primary documentation and official government pronouncements with secondary source material. To this end, it will draw on reporting documents including the DPRK’s *First National Communication Under the Framework Convention on Climate Change* and other mandatory reports tabled in compliance with the *United Nations Convention on Biological Diversity* (UNCBD) and the *United Nations Convention to Combat Desertification* (UNCCD). The UNFCCC, UNCBD and UNCCD are known as the “Rio Conventions” because they were tabled for signature or negotiated at the 1992 Earth Summit in Rio de Janeiro. North Korea ratified the UNCBD simultaneously with the UNFCCC in October 1994 but did not become a Party to the UNCCD until March 2004. UNCBD and UNCCD reports tell us much about North Korea’s UNFCCC compliance because the three Conventions share many objectives—such as conservation and protection of ecosystems (Article 4.1d) and protection and rehabilitation of drought-affected or degraded land areas (Article 4.1e) (Yamin and Depledge 2004)—and because UN agencies operating in North Korea have pooled their resources under a single strategic plan ('Strategic Framework 2011-2015' 2010) to address the objectives of the Rio Conventions simultaneously. Reports produced by UN agencies and other non-government agencies (NGOs) operating within North Korea are also consulted for data relevant to the international climate regime.

National Communications

Articles 4.1(a) and 4.1(j)

Article 4.1(b) of the UNFCCC and Article 10(b) of the Kyoto Protocol require signatory Parties to “formulate, implement, publish and regularly update” their national greenhouse gas mitigation and climate change adaptation programs. For Non-Annex I Parties, this information is to be included in national communications. North Korea’s *Second National Communication* to the UNFCCC, when released, will contain the most definitive appraisal of the government’s progress on mitigation and

adaptation policy to date. In the meantime, the 2012 *Environment and Climate Change Update*, reporting mechanisms from the other Rio Conventions and documentation published by UN agencies constitute the best guide to North Korea's mitigation and adaptation policy development.

North Korea ratified the UNFCCC on 5th March 1995 and submitted its *First National Communication Under the Framework Convention on Climate Change* in 2000, which provided an inventory of North Korea's greenhouse gas emissions, along with a summary of the country's emissions abatement measures and adaptation strategies. North Korea has yet to submit a second national communication, although a second national report has been in production with the assistance of the UNESCO Man and the Biosphere Programme (MAB National Committee of the DPRK, 2010). In December 2012, the Ministry of Land and Environment Protection published a report entitled *Environment and Climate Change Outlook*, which includes an updated greenhouse gas inventory for the year 2007 (both the 1990 and 2007 datasets are included in Table 1 below), cited from a 2010 study compiled by the Institute of Thermal Engineering in the State Academy of Sciences. This document serves as a useful proxy in the absence of an updated national communication.

The First National Communication was prepared with the assistance of a grant of US\$154,000 from the *Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS)* of the United Nations Development Programme and Global Environment Facility (Global Environment Facility 1997). The inventory of greenhouse gases by sources and sinks included in the First National Communication was compiled according to Intergovernmental Panel on Climate Change (IPCC) guidelines and takes the year 1990 as its baseline for greenhouse gas measurements (Ministry of Land and Environment Protection, 2004). As Table 1 indicates, North Korea's total greenhouse gas emissions budget for 1990 was 186,515 Gg of carbon dioxide equivalent (CO₂e). This figure is comparable in order of magnitude and size to other Asian states such as Thailand (185,700 Gg), Pakistan (144,400 Gg) and Taiwan (134,000 Gg) at 1990 levels (World Resources Institute, 2013). This comparison with countries of populations three and seven times the size of the DPRK respectively illuminates the relative carbon intensity of the North Korean economy in 1990 as one of the larger greenhouse gas polluters in the region. Conversely, the 2007 figure of 93,912.97 Gg CO₂e is comparable to very small countries such as Kuwait (68,410 Gg), Israel (67,250 Gg) and Finland (65,160 Gg), illustrating a significant drop in emissions intensity in the North Korean economy between 1990 and 2007 (World Resources Institute, 2013). Given the inextricable linkage between economic activity and greenhouse gas emissions in economies powered by fossil fuels, it is unsurprising that North Korea's greenhouse gas emissions output followed the downward trajectory of its economy between 1990 and 2007.

Sources and Sinks	CO ₂ Emissions (Gg)		CO ₂ Removals (Gg)		Net CO ₂ Emissions (Gg)		Non-CO ₂ Emissions (Gg) ¹		CO ₂ Equivalent (Gg)	
	1990	2007	1990	2007	1990	2007	1990	2007	1990	2007
Total emissions & removals	169,444.60	75,208.07	-14,631.00	11,000.99	154,813.54	64,207.08	1,009.20	2.06	186,515.00	93,912.97
1. Energy	159,941.90	72,085.37			159,941.90	72,085.37	977.40	2.06	178,996.00	84,990.85
A. Fuel combustion	159,941.90	72,085.37			159,941.90	72,085.37	315.50	0.44	165,875.00	75,527.59
Energy industry	90,775.30	28,008.59			90,775.30	28,008.59	166.30	0.22	94,635.00	28,146.21
Manufacturing industry & construction	34,272.80	15,002.06			34,272.80	15,002.06	135.50	0.12	35,707.00	15,101.40
Transportation	3,472.70	2,072.93			3,472.70	2,072.93	360.30	1.25	3,510.00	2,117.82
Others	15,685.70	24,952.55			15,685.70	24,952.55		0.03	16,501.00	28,008.51
Other	15,735.40	2,049.24			15,735.40	2,049.24			15,735.40	2,153.66
B. Fugitive fuel emission									12,721.80	9,463.26
Solid fuel									12,721.80	9,463.53
Oil and natural gas										0.73
2. Industrial process	9,502.70	3,122.71			9,502.70	3,122.71	7.91	149.79	9,855.13	4,253.21
A. Mining	8,074.65	1,959.50			8,074.65	1,959.50			8,074.65	1,960.52
B. Chemical industry	595.10	949.00			595.08	949.00	7.91	149.79	947.48	2,078.49
C. Metal production	833.00	214.20			833.00	214.20			833.00	214.20
3. Solvent and other products use										
4. Agriculture							20.32	26.81	11,654.31	12,908.60
A. Enteric fermentation									1,096.03	1,431.13
B. Manure management							0.02	0.01	818.90	210.86
C. Rice cultivation									3,440.22	2,960.04
D. Agricultural soils							20.30	26.80	6,299.20	8,306.58
5. Land use and change and forestry			-14,631.00	-11,000.99	-14,631.00	-11,000.99	3.67	3.67	-14,631.00	-10,985.98
A. Changes in forest & other woody biomass stocks			-15,021.00	-11,390.65	-15,021.00	-11,390.65			-15,021.00	-11,390.65
B. Forest & grassland conversion			298.00	297.99	298.00	297.99	3.67	3.67	298.00	313.00
C. Emission & removals of CO ₂ from soil			92.00	91.67	92.00	91.67			92.00	91.67
6. Waste									1,481.34	2,746.29
A. Solid waste disposal on land									1,396.71	2,649.72
B. Wastewater treatment									84.84	96.56
7. Others										

Table 1: DPRK National Greenhouse Gas Inventory, 1990 vs 2007 comparison. Source: (Ministry of Land and Environment Protection, 2012; 2004).¹

Policy Response

Articles 4.1(b)

Article 4.1(b) of the UNFCCC and Article 10(b) of the Kyoto Protocol require signatory Parties to “formulate, implement, publish and regularly update” their national greenhouse gas mitigation and climate change adaptation programs. For Non-Annex I Parties, this information is to be included in national communications. North Korea’s *Second National Communication* to the UNFCCC, when released, will contain the most definitive appraisal of the government’s progress on mitigation and adaptation policy to date. In the meantime, the 2012 *Environment and Climate Change Update*, reporting mechanisms from the other Rio Conventions and documentation published by UN agencies constitute the best guide to North Korea’s mitigation and adaptation policy development.

North Korea’s domestic energy security problem is well documented and can be divided into four distinct challenges: energy supply, electricity generation, electric power transmission, and secondary energy usage (Calder, 2004). The end of liquid fuel subsidies from Moscow after the Soviet collapse after 1991 created an energy shortfall in North Korea that undermined its command economy and contributed substantially to the Arduous March-period economic collapse. Given that the energy sector accounts for ninety percent of North Korea’s greenhouse gas emissions footprint (see Table 1), capacity-building in this area not only addresses North Korea’s emissions abatement and climate

¹ Greenhouse gases featured in Non-CO₂ Emissions statistic include methane (CH₄), nitrous oxide (N₂O), nitrogen oxide (NO_x), carbon monoxide (CO), and non-methane volatile organic compounds (NMVOC).

adaptation commitments under the UNFCCC but also attends to a major weakness in the political economy of the DPRK state.

The First National Communication makes a number of recommendations for greenhouse gas abatement in the energy sector. First, it recommends investment in improving the efficiency of electricity infrastructure, citing problems in generation and transmission as potential low-hanging fruit for carbon savings. Upgrading of physical plant at older power generation facilities would create efficiency gains, along with harnessing the cogeneration potential of industrial boilers and kilns (Ministry of Land and Environment Protection, 2004; Calder, 2004). The country's unreliable and wasteful electricity transmission infrastructure is also in desperate need of rehabilitation (Ministry of Land and Environment Protection, 2004) (UNICEF, 2010; Calder, 2004). The UN DPRK Country Team's 2005 *National Capacity Needs Self-Assessment* predicts that energy conservation measures alone could reduce energy demand by between twenty-five to thirty-five percent (UNDP, 2005).

Second, the National Communication recommends the adoption of "clean coal technologies" to reduce greenhouse gas emissions. Coal mining is one of the few non-illicit sectors where North Korea has a comparative advantage. Chinese state-owned companies began growing investment in North Korea's mining and resource sector from 2005, accelerating rapidly from 2008 (Gearin, 2010). According to Bank of Korea data for 2011, the mining sector grew by 0.9 percent, along with the construction (3.9 percent) and services (0.3 percent) sectors (Park, 2012). Because of its importance for domestic electricity generation and its export income value to Pyongyang's current accounts, coal is likely to remain an important component of North Korea's energy profile for some time to come.

Third, the National Communication and further subsequent official publications have called for the embrace of renewable energy technologies such as solar, wind, hydropower and biomass (Ministry of Land and Environment Protection, 2004; National Coordinating Committee for Environment, 2011). According to the *National Capacity Needs Self-Assessment* (UNDP, 2005), the North Korean government has a long-term national development plan for its energy sector that aims to increase the share of locally-generated renewable energy sources into the primary energy supply. Indeed renewable energy systems may be the most appropriate vehicle for increasing energy capacity because unlike large centralised fossil-fuel power generation, renewables can be scaled locally which reduces their up-front cost (Yi, et al., 2011).

Most significantly, renewables offer North Korea considerable scope for technology transfer, infrastructure upgrades and incomes streams through the vehicle of the Kyoto Protocol's *Clean Development Mechanism* (CDM). Enshrined under Article 12 of the Kyoto Protocol, the CDM was designed to assist Annex I Parties comply with their emission reduction commitments and assist Non-Annex I Parties in achieving sustainable development. CDM projects create certified emission credits that project participants can sell to Annex I Parties which count toward their emission reduction targets. They also provide complementary benefits to Non-Annex I participants, including technology transfer, rural energy provision, pollution reduction, and economic development (UNFCCC Secretariat, 2012). The Clean Development Mechanism could therefore present clear tangible benefits to the North Korean government in a key sector of the North Korean economy where redevelopment is sorely needed.

North Korea currently hosts six verified CDM projects in partnership with Czech company Topič Energo SRO, at hydropower stations including Hamhung Power Plant No. 1 in South Hamgyong Province (China Environmental United Certification Center, 2012a), Paekdusan Songun Youth 14 MW Hydropower Project No. 2 in Ryanggang Province (China Environmental United Certification Center, 2012c), Kumya Hydropower Plant in South Hamgyong Province (China Environmental United Certification Center, 2012b), along with Ryesonggang Hydropower Plant No. 4 (Det Norske Veritas, 2011b), Ryesonggang Hydropower Plant No. 5 (Det Norske Veritas, 2011c) and Ryesonggang Hydropower Plant No. 3 (Det Norske Veritas, 2011a) in North Hwanghae Province. Together, they account for an estimated annual reduction in CO₂e emissions of 193,475 metric tons (193.475 Gg, equating to 0.002% of North Korea's total emissions budget).

Several other CDM projects involving methane capture await verification at the time of writing. These include a national methane reduction program in partnership with Czech firm ET Biogas to harness biogas from animal waste to produce electricity in place of coal-powered electricity from the over-stretched national grid (Clean Development Mechanism Executive Board, 2011b). A venture at a textiles factory in Sinuiju aims to capture methane released from waste water that is stored in open ponds before being discharged into the Amnok River (Clean Development Mechanism Executive Board, 2012b). At the Kogonwon coal mine near the Tumen River frontier with China in North Hamgyong Province, methane generated underground during the coal mining process that would otherwise be vented into the atmosphere will be captured and flared (Clean Development Mechanism Executive Board, 2011a). There is also significant potential for expansion of CDM projects across the DPRK in hydroelectricity, reforestation and energy efficiency, where considerable low-hanging fruit for greenhouse gas abatement remains. The “CFL Lighting Scheme” in South Hamgyong Province, for example, aims to increase domestic household energy efficiency through the replacement of incandescent light bulbs with compact fluorescent lamps (Clean Development Mechanism Executive Board, 2012a).

Incorporating Climate Adaptation into Policy

Article 4.1(f)

Article 4.1(f) of the UNFCCC vaguely invites signatories to “take climate change considerations into account” and embed climate mitigation and adaptation strategies into policy-making processes. North Korea’s Rio Convention reporting documents describe a three-tiered institutional structure pertinent to environmental decision-making in the DPRK government. As North Korea’s highest legislative organ, the Supreme People’s Assembly is charged with approving laws related to environmental protection, which are then delegated to the Cabinet for implementation (Ministry of Land and Environment Protection, 2012; Németh, et al., 2008). The Cabinet has typically been the predominant institutional actor in economic policy and been the conduit through which the government leadership has engaged with the international community. It enjoys relatively significant autonomy in how it chooses to implement government policy and is known for its greater propensity for utilising specialist expertise than either the Workers’ Party of Korea or the Korean People’s Army (McEachern, 2010). For these reasons the Cabinet has been the driver of North Korea’s cooperation with the UNFCCC and an advocate for the capacity-building potential of these interactions.

Pyongyang’s environmental policy coordination and liaison with international environmental regimes takes place through the National Coordinating Committee for Environment (NCCE), a non-standing organ within the Cabinet of the North Korean government, acting as a hub for collaboration on environmental policies between sixteen government Ministries and bureaus including the Ministry of Land and Environment Protection (MLEP), Ministry of Foreign Affairs, and the State Academy of Sciences (Ministry of Land and Environment Protection, 2004). The NCCE is also the central liaison point between the North Korean government and international environmental regimes, institutions and non-government organisations (UNDP, 2005). As a floating organ of the Cabinet the NCCE is not responsible for environmental policy, with final decision-making resting with the Cabinet and ultimately the national leader via chain of command. Implementation of environmental policy takes place through People’s Committees, located at the provincial, municipal and county levels (National Coordinating Committee for Environment, 2007).

The institutional framework for environmental protection is scaffolded by a series of key environment-related laws and ideological pronouncements. Environmental laws in the DPRK were developed in response to the ineffectiveness of ideological statements from the leadership in ameliorating the destructive tendencies of North Korea’s heavy industrial development model (Nam, 2003). These laws theoretically provide legal protection against environmental degradation. For

example, the *Environment Protection Law* (1986) stipulates twenty-seven principles for protection of the natural environment and control of pollution (Articles 10-37); the *Land Development Planning Law* (2002) defines procedures for strategic management of land and environmental resources; the *Forest Law* (1992) classifies rules for the protection and development of forest resources; and the *Law on Agriculture* (1998) details provisions for agricultural development, irrigation management and natural disaster mitigation for arable lands (UNCCD, 2006). These laws exist within a lineage of leader's statements which provide the legal context for the implementation of climate change mitigation and adaptation strategies takes place.

In this context, ideological statements and instructions from the leadership constitute the normative foundation for behaviour, more so than the legal system *per se*. The North Korean legal system exists to legitimise political decisions already made by the leadership, as encapsulated in its ideological pronouncements (Zook, 2012). Laws in North Korea do not necessarily perform the same deterrence/compliance function as they do in other countries with more clearly articulated legal systems. The *Environment Protection Law* (1986), for example, is vague and open to interpretation, containing little detailed legal codification pertaining to rules, oversight or penalties for transgression (Articles 38-50 on the "Guidance and Control of Environmental Protection" are particularly pertinent here). Instead, North Korean legal instruments like the *Environment Protection Law* facilitate "after-the-fact legitimization" of government directives that do not necessarily provide the legal parameters of legitimate behaviour (Zook, 2012). North Korea's continuing compliance with the UNFCCC treaty and with its obligations more broadly under the Rio Conventions suggests a level of congruence between those obligations and the core interests of the DPRK state, of which official ideology is a reflection.

Transfer and Cooperation

Articles 4.1(c), 4.1(e), 4.1(g) and 4.1(h)

North Korea has signalled an increasing interest in flagging its legitimacy as a constructive participant in the international climate regime. Although there are several avenues open for inter-state cooperation within the UNFCCC, North Korea's interactions with the regime are largely funnelled through its relationship with the resident United Nations Country Team. The operations of United Nations agencies in action within the DPRK were centralised under the supervision of the UN Resident Coordinator (UNDP, 2013). Resident agency representatives meet weekly in Pyongyang to coordinate their activities. Each agency is paired with a liaison from the DPRK Ministry of Foreign Affairs (United Nations Resident Coordinator's Office, 2012). Coordination of project activities under the UN Country Team and the dedicated liaison channels with the North Korean bureaucracy fashions more predictable interactions between the UN agencies and the North Korean government. Bureaucratic centralisation of foreign agency activities makes sense from a practical perspective. Operations to fulfil the UN Strategic Framework for the four-year period to 2015 were budgeted at US\$288.3 million, excluding World Food Programme projects (United Nations Country Team, 2010), however the available funding pool for in-country projects is limited and prone to variability according to the fluctuations of regional nuclear proliferation diplomacy (UNICEF, 2010). Converging capacity-building priorities across agencies are also conducive to coordinated planning and resource sharing (United Nations Population Fund, 2010).

Information exchange is an important aspect of the obligations outlined in Article 4.1 of the UNFCCC, and of any international institution for that matter, because the "full, open and prompt" information exchange between Parties mandated in Article 4.1(h) of the Convention helps to reduce the uncertainty surrounding the actions of fellow signatories and thereby reduces risk of cooperative interaction (Keohane, 1989). Article 4.1(c) relates to the sharing of greenhouse gas abatement strategies among Convention signatories, however as a Non-Annex I Party, the DPRK is more a consumer than developer of greenhouse gas mitigation measures. Article 4.1(e) addresses cooperation in preparation for adaptation to climate change impacts across shared coastal and water

resources. Article 4.1(g) calls for cooperation in research, observation and data collection related to global climate systems and the socio-economic consequences different greenhouse gas abatement measures, while Article 4.1(h) calls for cooperation in the dissemination of this information.

The DPRK generally makes information available through the reporting mechanisms of the Rio Conventions and other related environmental regimes such as the UNESCO Man and the Biosphere Programme (MAB) and the East Asian Biosphere Reserve Network (EABRN). North Korea's *National Biodiversity Strategy and Action Plan* for the UNCBD (National Coordinating Committee for Environment, 2007) calls for further promotion of multilateral scientific "exchange and cooperation" and the strengthening of biodiversity conservation collaboration between the DPRK and other developing countries. Collaborative scientific exchange usually takes place through workshops with international agencies and key local stakeholders in Pyongyang, such as those conducted in the development of Rio Convention compliance reports, or less often by North Korean delegate participation at international conferences (UNCCD, 2006). The *First National Communication* (Ministry of Land and Environment Protection, 2004) emphasises the value of cooperation with international agencies, stating "the government will increase the support to environmental NGOs which plays a positive role in public environment-related activities."

While positive statements about these workshops also appear in North Korean English language media (Cha, 2011; Pak, 2011), international agencies are more guarded in their appraisal of collaborative ventures though generally careful to emphasise the opportunity for confidence-building and mutual trust that these events provide. It should be noted that North Korea's participation in UNFCCC Conference of Parties meetings has been sporadic and unobtrusive. Although it has traditionally been a member of the Group of 77 (G77) coalition in the United Nations, it is not an active member of any specific negotiating bloc within the UNFCCC (Yamin and Depledge, 2004). It has only sent delegates to three Conference of Parties since 1995—COP9 in Milan, COP15 in Copenhagen and COP17 in Durban—and when in attendance, its delegates have tabled no data or official statements to the proceedings. The Milan delegation featured two officials from the National Coordinating Committee for Environment and a secretary from the North Korean embassy to Italy (UNFCCC Secretariat, 2003). At Copenhagen the DPRK was represented by Ri Chol Hui, Ambassador to Denmark, and another consular official (UNFCCC Secretariat, 2009) and at Durban by a senior researcher from the State Academy of Sciences (UNFCCC Secretariat, 2011). With the exception of Ambassador Ri, none of the delegates representing the DPRK at Milan, Copenhagen or Durban were of sufficient bureaucratic rank to signal a strong commitment to the negotiating process.

Land Management

Article 4.1(d)

Degradation of the land base is another critical problem for the North Korean government, as both a symptom of the country's energy shortages and a multiplier of its food security problems. As a visitor to the DPRK one is struck by the sight of mountains and hillsides completely denuded of vegetation, much of which has been logged for fuel or cleared for hillside cultivation to address the shortage of arable land (National Coordinating Committee for Environment 2007; United Nations Development Programme, 2005). Approximately 18 percent of agricultural cultivation across the country takes place on slopes with a gradient steeper than fifteen degrees (Ministry of Land and Environment Protection, 2012). Strategies to address the country's arable land shortage have deep, ideological and historic roots stretching back to Kim Il Sung's enormous land reclamation campaign to bring the country into agricultural self-sufficiency. Mountainsides were terraced, land reclaimed from the sea, and over forty thousand kilometres of irrigation canals were cut to increase the stock of arable land for farming. These grand agricultural schemes came at a cost that would come back to haunt the government.

Deforestation of mountains for cultivation and firewood has reduced the water catchment capacity of mountain slopes because top soils are often washed away in the absence of any anchoring vegetation, leading to increasingly intense flooding events in the valleys below during heavy monsoon rains (World Food Program, 2006). When flooding occurs, crops sown in the valleys are destroyed, valuable soils washed away, roads are cut and rivers clogged with silt. Mounds of silt and rubble remaining from past flooding events are still evident in many of the river beds encountered by foreign observers. North Korea is susceptible to torrential rain and flooding, typhoons, drought, and acute cold weather. Since 1991, large-scale flooding events have occurred in 1995, 1996, 2001-02, 2004-07 and 2012, punctuated by drought years in 1997 and 2000 (Nanto and Chanlett-Avery, 2008). Although the North has increased its resilience against extreme weather events, crop damage from repeated and sustained natural disasters reduces the amount of produce available for distribution via the state ration and forces up the price of food sold on the black market (Yoo and Park, 2012; Food and Agriculture Organization, 2012).

The creation and maintenance of carbon sinks mandated in Article 4.1(d) of the UNFCCC directly addresses North Korea's land restoration needs and offers the greatest convergence between the compliance requirements of the other two Rio Conventions. Ecosystems maintained as carbon sinks satisfy the biodiversity conservation objective of the UNCBD and the prevention of land degradation central to the UNCCD (Yamin and Depledge, 2004) and as an adaptive measure, reforestation helps to reduce the impact of heavy precipitation events. To this end, North Korea's *First National Communication* (Ministry of Land and Environment Protection, 2004) recommends selective breeding of forest flora and improved human management of existing forest resources as key adaptation measures. The *National Report on UNCCD Implementation* (UNCCD, 2006) identifies the development of an integrated national database of land use to for monitoring and assessment to augment greater regulation of land use patterns as strategic priorities in combating land degradation. North Korea has a solid record of establishing nature reserves, including UNESCO-listed international biosphere reserves at Paektusan, Kuwolsan and Myohangsan (UNESCO, 2011), part of a larger network of nature reserves totalling 879,275.2 hectares area (National Coordinating Committee for Environment, 2007). These important conservation initiatives are necessary because of the conglomeration of pressures that have driven widespread deforestation across the DPRK.

Every spring and autumn, North Korean citizens are mobilised in land management campaigns that include major tree-planting initiatives (*Democratic People's Republic of Korea: Environment and Climate Change Outlook*, Ministry of Land and Environment Protection, 2012, "DPRK's Effort for Increasing Forest Resources," Korean Central News Agency, 2011). According to the *Fourth National Report* to the CBD, the North Korean government has created 800,000 hectares of plantation forest for firewood and strengthened forest management to curb illegal tree-felling (National Coordinating Committee for Environment, 2011). The Ministry of Land and Environment has also overseen agro-forestry management projects for sloping land, in conjunction with foreign agencies (National Coordinating Committee for Environment, 2011; Swiss Agency for Development and Cooperation, 2010). North Korea's *National Action Plan* for the UNCCD (UNCCD, 2006) identifies the establishment of timber and fruit tree plantations and livestock rearing as part of an integrated reforestation strategy to improve land management in mountainous areas.

Mitigation and adaptation recommendations for the agricultural sector similarly centre on capacity-building initiatives to improve crop fertility and productive output. The *First National Communication* outlines five capacity-building priorities: First, it recommends developing procedures to accelerate the crop transplanting process (Ministry of Land and Environment Protection, 2004). Productivity gains can be realised by minimising the time it takes to transplant greenhouse-reared seedlings into the fields where they will grow to maturity and developing improved post-harvest grain handling practices at cooperative farms across the country (UNDP, 2011). The second priority is a commitment to build soil fertility (Ministry of Land and Environment Protection, 2004), either through maximisation of chemical-based fertiliser use or through the emergent practice of composting farm waste to produce organic fertiliser (Ministry of Land and Environment Protection, 2012; National Coordinating Committee for Environment, 2011). The proportion of cultivated land in North

Korea is estimated at 17-18 percent of the total land area, much of which was poorly productive due to inferior soil fertility (FAO / WFP, 2008).

Third, the UNFCCC *National Communication* recommends water security measures such as the installation of improved irrigation systems to reduce soil moisture loss through evapo-transpiration (Ministry of Land and Environment Protection, 2004). Fourth, the National Communication advocates for improvement in seed propagation to selectively develop crop varieties more hardened to the changing climate regime across the country (Ministry of Land and Environment Protection, 2004). The Ministry of Agriculture in collaboration with the UNDP has established four certified seed farms to develop seed stock that meets international fertility standards (UNDP, 2011). Finally, the National Communication calls for greater crop rotation to improve productivity and crop vulnerability to climatic stress, in addition to a double cropping cultivating schedule to maximise yield from the available arable land base across the growing season (Ministry of Land and Environment Protection, 2004).

Education

Article 4.1(i)

Nowhere is this tension clearer than in Pyongyang's environmental education efforts. Education, training and public awareness are identified as key components of national climate mitigation and adaptation capacity building in Article 4.1(i) of the Convention and Article 10(e) of the Kyoto Protocol. North Korea's Rio Convention reporting documents point to government-sponsored climate change awareness-raising in the education system and across the wider population via citizen organisations, official media and public workshops.

The government provides for eleven years of compulsory education for North Korean children. Literacy rates are high across the country because nearly all North Korean youth graduate from secondary school, although teaching methods and resources remain rudimentary by world standards (United Nations Country Team, 2010). Children begin undertaking environmental learning activities at the kindergarten level and continue through primary school with "nature observation" subjects. At secondary school, students take subjects in biology and geography that incorporate units on biodiversity conservation. Specialist programs in biodiversity and the environment are available at the university level for students who go on to tertiary study (UNCBD, 2011). Conservation activities are also included in the extracurricular activity program of primary and secondary school students, who are organised into "Care for the Homeland Teams" which maintain public cleanliness in local areas. These groups are particularly active during the biannual reforestation drives during spring and autumn (UNCBD, 2007). It is not possible however to assess how environmental conservation learning in the North Korean education system compares with other countries in the absence of access to detailed curriculum documents.

Outside of the education system, climate change awareness is communicated through a number of other channels. The Korean Natural Conservation Union within the State Academy of Sciences is the primary outlet for environmental communication with the public, although other people's organisations are also active in disseminating information (UNCBD, 2007). It is mandatory for North Koreans to be members of political organisation of one form or another, as these are the conduits for ideological education from the national leadership (Lankov 2007). Public education is fostered through television and radio, which broadcast documentary programs with environmental themes such as "Eco-environment and Human Life" and "Global Warming", and print media sources such as *Rodong Sinmun*, *Rodong Chongnyon*, *Pyongyang Sinmun* and *Minju Jonson* which periodically publish editorial content with environmental themes (UNCBD, 2011). Often special days such as "World Environment Day," "World Meteorology Day" and "Earth Day" become the focus of environmental awareness messaging.

Conclusion

The North Korean government is participating within the UNFCCC through numerous climate mitigation and adaptation capacity-building programs in collaboration with several non-government and international agencies, supporting the assertion that the DPRK has been a constructive signatory to international environmental regimes (Na, 2012). However, Pyongyang's commitment to the global climate mitigation project through collective international management of the atmospheric commons is less certain. The relationship between official ideology, state survival and the natural world in North Korea creates multiple lines of tension that complicate the implementation of commitments outlined in Article 4.1 of the Convention. Nonetheless, North Korea is complying with its commitments as a Non-Annex I Party to the UNFCCC. However its mitigation and adaptation strategies are hampered by a convergence of technical capacity constraints, lingering ideological rigidity in decision-making processes and the political imperatives of a society in permanent state of revolutionary mobilisation. The fact that UNFCCC compliance has persisted and evolved over time suggests that the objectives of the international climate change regime coalesce with core legitimacy and survival imperatives of the Kim government and the DPRK state. North Korea therefore practices an instrumental commitment to the international climate change regime for capacity-building purposes without whole-hearted engagement with the over-arching goals of the UNFCCC.

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