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**Working Paper**

## Spatial planning and economic development in border region: The experiences of Gangwon Province, Korea

Ordnungspolitische Diskurse, No. 2010-05

**Provided in Cooperation with:**

OrdnungsPolitisches Portal (OPO)

*Suggested Citation:* Kim, Jeong Ho (2010) : Spatial planning and economic development in border region: The experiences of Gangwon Province, Korea, Ordnungspolitische Diskurse, No. 2010-05, OrdnungsPolitisches Portal (OPO), s.l.

This Version is available at:

<https://hdl.handle.net/10419/55424>

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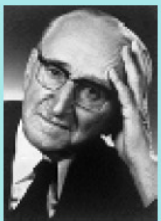
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# Ordnungspolitische Diskurse

## Discourses in Social Market Economy



**Jeong Ho Kim**

**Spatial Planning and Economic  
Development in Border Region:  
The Experiences of Gangwon  
Province, Korea**

**Diskurs 2010 – 05**

**Jeong Ho Kim**

# **Spatial Planning and Economic Development in Border Region: The Experiences of Gangwon Province, Korea**

Gangwon province has suffered from low rate of regional economic growth, resulting in exodus of locally well educated young workforce and thus, losing vitality and sense of hope. The situation will aggravate unless one turns the tide upside down. Now it appears that the time has come for the province to do it since the Korean government announced the green growth strategies last year. This paper strongly suggests that Gangwon province may have to shift its regional development strategy in order to ride on the green wave and should not miss the opportunity to make up for the stagnant growth that it has experienced over the last ten or more years.

The paper has four objectives in mind; the first one is to briefly investigate why the regional economic growth has been slow to the extent that it cannot absorb even the locally trained/educated high quality work force.

Secondly it critically reviews major policies and programs being initiated by, and embedded with, the provincial government. Various efforts have been made to revitalize region's economy, e.g., promoting tourism and high-tech and green ocean businesses, inducement of manufacturing firms from outside, and etc.

Thirdly it suggests ways to increase value added of such prevailing industries as tourism, agriculture and service sector. Simultaneously it strongly argues that the province ought to utilize 'naturally endowed green resources,' water, forest and mining resources in particular.

The final section of the paper focuses on green growth strategies, beginning with a discussion of locally initiated renewable energy production. Gangwon province is forerunner with respect to renewable energy, being led by wind power, biomass and hydro electric power. There remains much room for further development of renewable energy in the province. The discussion then explores green growth strategies at the national level and identifies a number of projects consistent with, and conceivably matching with, the national strategies.

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# Spatial Planning and Economic Development in Border Region: The Experiences of Gangwon Province, Korea

## Gangwon Province: Geographical and Demographic Features

As shown in the map below, the Gangwon province is located east of the Seoul Metropolitan Area (SMA) and bordered with North Korea along the DMZ (Demilitarized Zone). It is relatively large in physical size with 16,894Km<sup>2</sup> or 16% of Korea's total land area, but rather sparsely populated with only 1.52 million people or 3.1% of the nation's total population as of 2006.

Figure 1. Map of Gangwon Province



The province has been renowned for its beautiful scenery with mountain, rugged hills, ocean, rivers, lakes, beaches, and numerous sightseeing points. Note that the province has been divided into South and North with the demilitarized zone (DMZ) in-between. Both South and North Gangwon provinces are similar in physical and population size. The province has been traditionally farmland, growing live stocks and people living in the eastern seashore used to live on fishing and mining.

The percentage of the land being set aside for agricultural use is almost 70%, being followed by 27% of forest and 19% of military use. Also noted is the preserved and protected area of Baikdu Mountain Range, extending from Mt. Kumgang (Diamond mountain) of the North to Cholla and Gyungsang provinces of the South. It lies right in the middle of Gangwon province, dividing the province into two distinctive sub-regions – Yongdong (east Gangwon) and Yongseo (west Gangwon). The Baikdu Mountain Range looks more like a spinal cord for a human being.

While much of the land in the province is reserved and tightly controlled, only 2.4% of the province’s land has been allowed for urban use; i.e. for residential, commercial and industrial purposes. And the percentage share of industrial land is less than one sixth of the national average. According to the land use statistics of 2006, over 82% of the province is covered with green land – mountain, hills, pristine valleys, etc., whereas the greenery open space consists of 64% throughout the province.<sup>1</sup>

The Population has continuously decreased since 1970s. As shown in Table 1 below it was recorded over 1.87million or 6% of the nation’s total population in the 1970’s. Decrease in population has a lot to do with the region’s sluggish economy.

**Table 1. Change in Population (1970 – 2006)** (unit: 10,000, %)

1970	1980	1985	1990	1995	2000	2006
186.7	179.1	172.5	158.0	153.0	155.9	151.6
(6.0)	(4.8)	(4.3)	(3.6)	(3.3)	(3.2)	(3.1)

Source: Gangwon Census of Population and Households, Gangwon Provincial Government

<sup>1</sup> Land Use Statistics for Gangwon Province, Statistical Year Book of 2007, Gangwon Province

The province's gross regional domestic products (GRDP) amounted to 24 trillion won in 2006, but it fell down to 20.6 trillion won in 2007. It accounted for only 2.4% of the nation's GDP, second lowest percentage share among 16 regions compared (the small Jeju island being the first). It grew at an annual rate of 2.3% between 1996 and 2006, which was relatively low as compared to those of other regions. The nation's GDP has grown by almost 6.6% on average during the same period.

The percentage share has gradually declined since 1986. The per capita income (GRDP) was only 16 million won as of 2006, about 87% of the nation's average.

**Rationale behind the Slow Economic Growth**

The primary reason behind this gloomy economic picture can be easily traceable if one looks at the changing industrial structure of the province. As shown in Table 2, the structure is highly skewed toward such sectors as farming, construction, tourism, and services (public service included), which altogether comprises about 65% of the region's GRDP. The percentage share of the manufacturing sector was only 11.5% in 2007, down from 13.3% in 1996, less than one third of its national share.

**Table 2: Industrial Structure of Gangwon Province as Compared with the Nation as a Whole**

	Uift	Const	tourism Related indust	agriculture Forestry fishery	Others Lie. Service	Public adm./ defense Personal
Gangwon	8.6	13.6	17.0	5.4	55.4	18.0
Nation	25.2	8.2	15.8	2.8	48.0	5.8
Average of 9 Provinces*	32.8	9.3	11.4	4.8	41.7	6.8

\* Large metropolitan areas such as Seoul, Busan, Daigu, Inchun, Gwangju, Ulsan, are excluded.

Manufacturing sector is emphasized because it is most likely to create a large number of jobs relative to other sectors. The share of the banking and financial sector is also as low as 5%, about 3% lower than the national average.

Only 21 trillion won of credit was received and 17 trillion won extended by the local financial institutions in 2006, which was less than 1.5% of the total credit received

and extended for the country as a whole. The financial sector is very important for regional growth as it contributes significantly to the local economy in many ways; as a feeder of locally circulated money and investment funds and as a major employer of locally educated youth.

It follows that a significantly large number of business firms/establishments have left the region, resulting in decrease of percentage share from 4.1% in 1985 to 3.5% in 2006. Equally serious is that both inter-industry and intra-industry value chain is very weak, implying that many consumer durables and electric and electronic products are imported as in finished form. Accordingly, significantly large amount of money that is being spent on these goods by the residents is leaking out of the region, thus being not circulated within the region to have trickle-down effects on regional economy. In fact, according to a report by the Gangwon Branch Office of the Bank of Korea (BOA), the inter-regional trade deficit for Gangwon province amounted to over 3 trillion won a year on average between 2003 and 2006.<sup>2</sup>

As pointed out, the regional economy suffered most when a large number of manufacturing and mining firms, both of which happened to be the largest employers throughout 1970's and early 1980's, were either out of business or left the region since late 1980's. The mining industry was important as its share of GRDP was as high as 12% even in 1985, but it declined to only 1.4% in 2006.

The manufacturing sector experienced slightly less decline, reaching as high as 16% in 1999 and declining to 8.6% in 2006, which was quite low as compared to the national average of 25.2%. Even the ones still in business are mostly either non-metallic firms like cement (28% in 2006) or firms specializing in food and beverage type like beer and hard liquor (26%), thus exerting relatively low degree of linkage effects on other industries in the region.

Overall the industrial structure of the province substantially weakened since late 1980's. Unfortunately province failed to substitute the foregone industries for more productive, high value added and regionally oriented ones. Equally important factors that impeded revival of the region's economy were a series of regulations and poor quality of physical infrastructure. Being bordered with the North Korea, the region's development activities had been regulated and tightly controlled. Military facilities,

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<sup>2</sup> *Gangwon Regional Economy and Its Direction for Development*, a mimeograph, February, 2008, Gangwon Branch Office, BOA

small and large, while heavily concentrated in the border area of DMZ, are scattered all over the province, pushing business firms out of the region.

Another factor is conservation and preservation movement. The province is well known for its natural beauty and clean environment as well as historical and cultural assets, old Buddhist temples in particular, many of which are being designated as national treasures. And both the central and local governments want to keep it that way by reinforcing various regulations pertaining to conservation and preservation. For example, the Ministry of Environment recently strengthened a set of measures that would discourage manufacturing firms to locate there and high and medium density urban development to take place. These kinds of measures, coupled with regulatory control, negatively impacted growth momentum, discouraged private investments, and consequently, resulted in reduction of jobs and employment opportunities for local residents.

The poor quality of physical infrastructure was another factor that prevented businesses from either moving or settling there. In spite of physical size the percentage share of the province’s social overhead capital (SOC) stock was only 7.4% in 2006, implying that the region had long been underinvested with infrastructure facilities, e.g. road, highways, railroad, expansion of air- and sea-ports. As shown in Table 2 below, the total value of SOC stock was estimated at 37.9 trillion won in Gangwon province, quite low as compared to those of another regions of similar size, including Chonlla and Chungchung provinces, 89.5 trillion won and 75.5 trillion won, respectively.

**Table 2. SOC Stock by Regions as of 2004**

	Gangwon	SMA	Chungchung	Chonlla	Gyungsang
Value in trillion won*	37.9	150.3	75.5	89.5	156.7
% Share	7.2	29.8	14.7	17.6	30.2

Source: Korea Research Institute for Human Settlements (KRIHS)

\*Note: 1000won = 57euro

For example, the total road length per km<sup>2</sup> (a measure of road density) in Gangwon Province was only 0.57 km<sup>2</sup> in 2006, which was only two thirds of the nine non-



metropolitan region combined average of .90 km<sup>2</sup>. The nine regions, exclusive of metropolitan cities, are the ones comparable with Gangwon province in terms of physical features and socio-economic characteristics. The percentage of paved road in Gangwon was only 69% in 2006, again much lower than the national average of the non-metropolitan regions (77.6%). The region is also inadequately and poorly facilitated with port system; the loading and unloading capacity of five small ports combined in the region was only 55,520M/T or 8.1% of the nation's total port capacity. The figure is so low that it is comparable only with Woolsan, a medium sized industrial port city located southeast of South Gyungsang province.

A few reasons can be cited for inadequate provision of infrastructure facility and services in Gangwon province. First, insufficient funding on the part of the provincial government! Most of the locally initiated infrastructure developments have taken place in the form of matching fund. The local governments are required to match up to 50% of the funding needs either in cash and/or in-kind. It was not easy for the Gangwon province to meet such requirements because the province's 'self-sufficiency rate of local finance' has been very low; only 26% in 2006 for example, quite contrasting to other provinces such as Seoul (95%), Gyungki (78%) and South Gyungsang (39%).

The other reason is relatively high cost of building infrastructure in Gangwon province because construction usually takes place along with the rugged hills, rivers and streams and deep valleys, not to mention high and rocky mountain ranges. There are so many tunnels and bridges. More recent estimate indicates that highway construction cost per kilometer in Gangwon province averages 43billion won (approximately 24.6million euro), twice as much as the national average of 22billion won (12.6million euro). Another reason is related to a series of land use regulations and controls, which inherently prohibit infrastructure provision. The total area being under multiple control amounts to 1.7 times the physical size of the province itself. The border areas are controlled two to three times more heavily. More specifically the areal sizes of land being controlled and regulated for different purposes are as follows.

**Table 3. Land Area under Control (2005)** (Unit: km<sup>2</sup>, %)

Agric. land	Forest land	Military facility land	Baikdu mountains Preser. area	Water Qual pro Area	Other	Total
11,116	4,535	3,159	1,339	103	7,673	27,925
66.9	27.3	10.0	8.1	0.6	46.2	168.1

Source: Gangwon Provincial Government, The Bureau of Statistics

### Efforts for Sustained Regional Growth

Given the above mentioned constraints that have prevented the region from more active and far-fetched developments, the provincial government has strongly promoted a few selected industries, and among them there are tourism industry, research/develop-and-knowledge-based industry, renewable energy industry and education industry to some extent.

Clearly the Gangwon province is ahead of other regions in the country with regard to the tourism industry as it has a variety of tourism resources that can be 'commercially' tapped'. The province has 99 parks and over 100 waterfalls and deep valleys as shown in Table below.

**Table 4. Tourism Resources as of 2006**

	National Parks	Waterfalls Valleys	Lakes Rivers Caves	Forest area	Other	Total
<b>Gangwon(A)</b>	99	107	31	19	113	369
<b>Nation as A whole(B)</b>	442	308	109	155	679	1,693
<b>A/B(%)</b>	22.4	34.7	28.4	12.3	29.5	21.8

Source: Korea Tourism Business Corporation

It also has so many natural and historical sights to appreciate and many events to experience with, and participate in; waterfalls, valleys, lakes, rivers, caves, beaches, as well as forest and mountain, small and big in size. People can enjoy all year around sports in Gangwon province; hiking, mountain climbing, swimming and sun bath, scuba diving, golfing, yachting, skiing and other winter sports as well. It

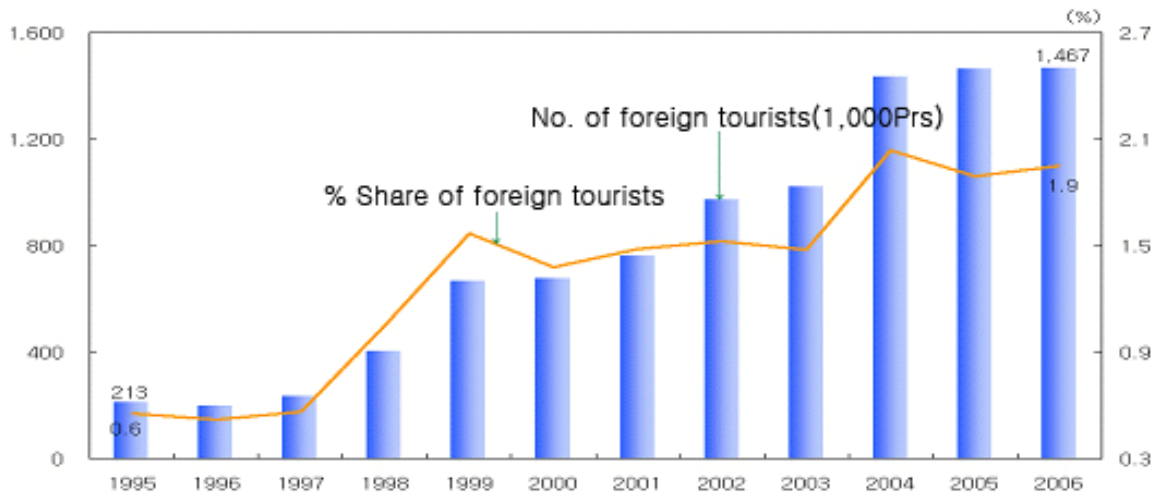
provides leisure facilities of all kinds for visitors although their quality needs substantial improvement.

Thanks to its natural setting the province attracts a large number of tourists from all over the country, particularly from the Seoul Metropolitan Area (SMA). Accordingly the tourism industry has contributed to the region's GRDP substantially to the extent that its percentage share to the province's GRDP is as high as 17%, which is the second highest among 16 provinces next to Jeju where the figure is 25.6%. Similarly its percentage contribution to the region's economic growth was 17.5%, far exceeding those of other regions.

Nonetheless the industry has never been perceived as the major one, leading the region's economic growth. The number of tourists increased at a rate of 6.3% a year over the period of 1996-2006, amounting to about 80 million in 2006. Other regions, however, experienced even higher rate of increase in tourists in recent years. For example, South Cholla province recorded 11.3% increase during the same period. The number of tourists jumped up as a result of the North Korean decision to open up the Diamond mountain to the tourists from the south. The opening year of 1998 saw only a few thousand tourists of the Diamond mountain, but the number grew rapidly as many as 350 thousand in 2007. But now unfortunately it has been closed since a gun shot killing accident took place at the resort beach two years ago.

The number of foreign tourists increased quite rapidly in late 1990s due in part to 'hanryu' (Korean wave), but lately 'hanryu related tourists (mostly Japanese) decreased drastically, particularly since 2004. The foreign tourists numbered only 200 thousand in 1996, but they increased up to 1.5 million in 2006. Actually the number has been rather steady since 2004 as shown in figure below.

**Figure 2. Foreign Tourists Visiting Gangwon Province**



Source: Tourist Statistics of 1995-2006, Korea Tourism Corporation

Various efforts have been made not only to attract the tourists, both domestic and foreign, but to make them stay longer and spend more on local goods and services; Good cases in point are events and festivals mostly organized by either local authorities or merchants' associations, and some big ones have been sponsored by the provincial government. Over 200 festivals of various kinds took place in 2006 alone, but only less than 20% of them were assessed to make profits; i.e. positive rate of return on investment.

Finally, a survey indicates that the majority of visitors are not satisfied with local foods and shopping facilities while appreciating relatively more with sightseeing and tourism contents.<sup>3</sup> Problem is that shops, lodgings and restaurants are small in scale and managed in 'mom and pop style'. And goods and services they provide are rated low in quality and far from satisfying tourists of diverse tastes, relatively well educated and professionals in particular who tend to spend more. Most of the shops are small in size and poorly managed, with insufficient funds for further investment to improve the quality of services. In fact according to a survey in 2005, almost 70% of them barely survive with less than 50 million won of capital, and the percentage of businesses owning capital asset of over 1 billion won is only 0.3%.<sup>4</sup>

<sup>3</sup> National Survey on Tourists of 2006 by Korea Tourism Corporation

<sup>4</sup> Survey on Service Industries, National Statistical Office, 2005

This implies that more investment capital must be secured to help modernize local tourism businesses if the province perceives tourism industry as a means to promote local economy.

Manufacturing sector also suffered from fast decline. As mentioned, it has weakened largely because of poor access to markets, insufficiency in capital funds, inadequate infrastructure services, and particularly, various controls and regulations, environmental and otherwise. Even the ones that have survived are marginal in terms of the size and can hardly contribute to creating a significant number of jobs for local labor market. Three quarters of the firms in the sector are employing less than 5 persons and the percentage of the employees who are working for large corporations is only 12.3%, quite low as compared to 22% for the nation as a whole, excluding SMA and other metropolitan cities. The percentage share of large corporations, as defined in terms of number of employees over 300 or more, is only 0.1% in 2006 (6 out of 1,000 for the nation as a whole) and it stays same even now as shown in Table below.

**Table 5. Percentage Distribution of Manufacturing Firms by Size (2006)**

(%)

	Very small (1~4per)	small (5~49per)	Medium (50~299per)	large (300over)
No. of Businesses	74.6 (58.9)	24.0 (37.7)	1.3 (3.1)	0.1 (0.2)
No. of Employees	21.3 (10.3)	45.8 (41.9)	20.7 (26.5)	12.3 (21.3)

Source: 2008 Survey on Business Enterprises, the National Bureau of Statistics

\*( ) means the percentage for 9 provinces similar to the Gangwon province in terms of urban-rural population make-up, excluding large Metro Cities

In the absence of large corporations there rarely exists intra-industry value chain and inter-industry integration with, and among, the small and medium sized business firms, and consequently, technology transfer and job creation are not easy to occur. Large corporations tend to locate in large cities to take advantage of scale economies and easy access to market, valuable information and especially,

labor pool. In that respect the Seoul Metropolitan Area (SMA) is preferred to any other locations and accordingly, interregional disparity in economic growth and regional income aggravates. According to 2006 report by the Korean Chamber of Commerce, large corporations are mostly located in Seoul (534) and its contiguous province of Gyunggi (141). In Gangwon province there are only 6 of them.<sup>5</sup>

Efforts have been also made to promote, what is called, knowledge-based, green ocean industries, which largely consist of research/development activities, including those on BT (bio tech), IT, CT (cultural tech), NT (nano technology) and ET(environmental tech). As shown in Table 6 below, the provincial government invested over 83.6billion won in BT, 14billion won in ET, and 1.7billion won in NT in 2007 alone. The total amount of investment, accumulated between 2001 and 2008, on R/D was recorded at over 890b won. The total figures come about as the government contributions and the local matching funds are added together.

**Table 6. Contribution of Strategic Industries to Value Added and Jobs Created**

	#of Companies	#of Employees	Sales (in million won)	Exports (10 millions)	Patents issued	Patents registered	Patents in use
Bio tech	139	2,187	240,043	13,440	366	76	81
Medical equipment	72	1,362	443,564	240,138	26	54	33
Ceramics	60	1,645	176,341	12,262	3	15	-
Disaster Prevention *	8	39	200	-	-	-	3
Plasma	9	71	5,447	-	1	8	2
IT	109	1,001	61,362	26,400	4	21	5
<b>Total</b>	<b>397</b>	<b>6,305</b>	<b>926,957</b>	<b>292,240</b>	<b>400</b>	<b>174</b>	<b>124</b>

Source: Gangwon Technological Park Office, Gangwon Province

Such R/D efforts significantly impacted region’s economy in many ways; first almost 400 firms came into being, employing approximately 6,300 and generating total sales revenue of close to 1 trillion won as of 2006. They also made contributions to increasing exports in the amount of 292billion won. Additionally almost 400 patents were issued and 174 of them formally registered. A large number of patents have recently been issued, but only a small number of them are in use.

<sup>5</sup> Regional Distribution of 1000 Business Enterprises by Annual Sales Volume, The Korean Chamber of Commerce, 2006

The total value added generated by this sector amounted to 700 billion won, approximately 3% of the province's GRDP.

Another effort worthy noting was to induce firms from outside, manufacturing firms from Seoul Metropolitan Area (SMA) in particular. A total of 314 firms moved to the province as a result of the inducement effort for a five year period between 2000 and 2005. But majority of them were unstable both financially and technologically to a lesser extent. Of those that survived after moving to the region many made only a marginal contribution to job creation. On the other hand tourism industry has been very slow to innovate. Increasing number of tourists notwithstanding, tourism-generated regional income was not substantial, largely due to a short supply of good quality tourism products and inadequate commercial facilities. In fact large scale multi-purpose resort developments have rarely taken place until only lately.<sup>6</sup>

Despite all these efforts on the part of the provincial government the province has continuously lost its population and the ones who moved out were mostly the well-educated youth. For example, the province lost 17 thousand people in 2002 and 10.5 thousand out of them were the youth and 2.2 thousand, the aged. In recent years the situation gets stabilized as out-migrants have decreased to 5.4 thousand as of November of 2007. But outmigration of the youth population still continues with over 6 thousand while in-migration of the aged population increased by 1.7 thousand during the same period. Consequently the province is losing its vitality and unless some drastic measures are taken by both the central government and the provincial government alike, it would be difficult to reverse the tide once and for all.

### **Further Efforts Required to Make Regional Industries Competitive**

It is suggested that the province ought to do utmost in expanding the scale and maximizing both horizontal and vertical value chains with such industrial sectors as culture, MICE (meeting, incentives, conferences and events), medicine, food and entertainment, and event. Otherwise the tourism industry will remain stagnant and lose its superior position to other regions. And the key to success in agriculture and fishery industry is to find niche markets and sell products at right time and place for

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<sup>6</sup> The number of firms moving into the province has substantially increased recently; over 350 firms moved in last year alone, but many of them are found to be marginal, with weak asset structure. (Survey on Gangwon Firms, Bureau of Economy and Industry, Gangwon Provincial Government)

good prices. One such market is that of yuppies and well-to-do seniors who are very sensitive to fresh and high quality wellbeing farm produces.

This implies that one should undertake market segmentation study in order to identify such profitable markets. Eco-tourism is another business area that would attract a lot of tourists from cities, especially the SMA. The number of visitors for farm-stay/-tour and guided forest/national park tour has rapidly increased in recent years.

Despite rapid increase in the number of tourists, both domestic and foreign, over the last ten or more years, the regional income generated by the tourism industry has not increased significantly because tourists have not spent much as desired while on tour in Gangwon province. The average amount of money they spent when visiting Gangwon amounted to only 74 thousand won for food, lodging and entertainment combined. Nevertheless foreign tourists tended to spend substantially more (174 thousand won). The Gangwon province is also famous for festivals and events (over 200 a year) which attract people from all over the country. But they do not seem to generate a large amount of money either, as much as the organizers anticipate.

Tourists are less likely to spend on lodging because most of them make a long distance trip to Gangwon province as the road transportation system has significantly improved recently. But they do not have to stay overnight; instead either half day or one full day trip becomes common, and even so. many people bring their own lunches and beverages rather than patronizing local restraints and shops.

Strategically important is that manufacturing industry should be integrated with R/D industries by mutually sharing relevant information in technology, knowledge, market and even labor pool in order to maximize synergy effects and to further strengthen region-specific industrial bases. There are over 20 colleges and universities in Gangwon province and 10 of them are research oriented large universities. They produce a significant number of research outputs, but unfortunately only a handful of them are commercially utilized and even so, they occur outside of the region, mostly in SMA where entrepreneurs can have much better access to venture capitals, large markets, and good quality labor pool.

Besides such venture businesses can barely survive unless their products are somehow tied into those of large corporations, either producer of parts or OME producer.



Most of the large corporations are located in SMA and thus, the province must cooperate with cities and counties of SMA, including the Gyunggi province, Seoul, Incheon etc. Efforts should also be made to work together with other provinces nearby such as North Gyungsang province and North Chungchung province in mutually reinforcing way. One thing they can do is to develop an inter-regional business cluster, to share information and independently produced knowledge and to manage relevant markets collaboratively. Sheer competition among them will make the matters even worse; instead, they have to exert unified efforts to reinforce and strengthen the own market power. Integration, both inter-industrial and inter-regional, seems to be the only way for them to make any progress.

Inter-regional cooperation is particularly needed in medical equipment industry. The government declared that it would promote medical care industry to the extent that it could be globally competitive. And recently it designated two regions of the city of Daigye in North Gyungsang province and the city of Chungju in North Chungchung province as the hub of the nation's medical industry. It'll provide funds and infrastructure investments to help them build R/D based medical complex where they can produce advanced medical equipments and pharmaceutical products for export, e.g. vaccine, new drugs, etc. The Gangwon province has succeeded in medical equipment businesses to the extent that it exports \$160 million worth of medical equipments a year on average. The Gangwon province must cooperate with the two nearby provinces in the future to promote and sustain export-oriented medical industry; it can't expand unless it secures supports from both; because they have the markets, capital and labor pool.

### **Indigenous Green and Naturally Endowed Resources**

Equally important is timely utilization of 'naturally endowed resources' as growth engines. For example, the province produces over 26.5 billion tons of water, but consumes only 1.6 billion tons a year (6%) and let most of it (94%) flow down to SMA. Over 14 million people, mostly SMA residents, together with factories, offices and commercial establishments, rely on the water almost free of charge. It is strongly suggested that the province should develop water industry on its own and in doing so, it must secure water right in an anticipation of inter-regional water disputes in the future. Water is now no longer perceived as free good!

Gangwon province is responsible for almost one third of the nation’s total water supply, but has never taken it seriously as the region’s cash cow industry. The people in the SMA consume high quality, but cheap, water at the expense of Gangwon residents, who had to give up their property rights in part or whole in order to maintain water quality in the upper basin of the Han River. Resource tax is levied on water being used for generating hydroelectric power, but the charge is very minimal; a quarter won per ton of water. Water user charge has been imposed upon the residents of the SMA in the amount of 160won (0.09euro) per ton of water, but the revenues being collected are used only for maintaining and improving water quality. That is why it is also referred to as water quality maintenance fee. Some funds set aside for Gangwon province have been mostly invested in installation, modernization and replacement of sewage facilities.

**Table 7. Water Usage by Types**

	Total	Household use (Piped water)	Industrial use	Agriculture use
Quantity	1,610.8	328.0	58.0	1,224.8
% ratio	100%	20%	4%	76%

(Unit: million ton)

Source: Korea Water Resource Corporation

Gangwon’s water, whether ground or underground, is analyzed with respect to quality and taste, and is judged to adequately meet both standards. The province may be able to enter the bottled pure water global market and compete with such international brands as Perrier, Pure Life, and even Evian, if Gangwon produced-water taste could be made globally appealing.

Another poorly tapped resource is forest. The area covered by forest in the province is 13,700Km<sup>2</sup>, almost 21.4% of the nation’s total forest area (while Gangwon province’s percentage share of the areal size is 16% - 63,900Km<sup>2</sup>, the total land mass). Time has come to reassess the value of forest in greening era; 81% of Gangwon’s land is covered with forest and the cumulative density of tree population

is almost 1.5 times the national average. The total tree stock density in 1,000m<sup>2</sup> runs as high as 168 thousand or 32% of the national average.<sup>7</sup>

Economic potential of forest is expected to be tremendous when carbon emission market opens sooner or later as the one operating in EU because forest can serve as major carbon absorption agent. The forest is expected to generate 80billion won(46million euro) worth of market.<sup>8</sup> Other values are even greater! The Table below shows the other economic values of Gangwon's forest in aggregate. The market value of the Gangwon forest as of 2009 is estimated at a total of 15 trillion won as shown below.

**Table 8. Economic Value of Gangwon's Forest\***

(Unit: 100million won)			
	Country as a whole (A)	Gangwon Province (B)	B/A, %
<b>Total value</b>	<b>499,510</b>	<b>149,601</b>	<b>30.0</b>
Cleaning the air	135,350	41,282	30.5
Water reserve and supply	132,990	44,418	33.4
Prevention of soil loss	100,560	21,419	21.3
Recreation/therapy	48,300	19,300	40.0
Purification of forest	48,270	15,977	33.1
Prevention of mud sliding	26,360	5,615	21.3
Wild life protection	7,680	1,590	20.7

Source: Research Institute for Gangwon (RIG), Economic Value of Forest

\*15trillion Won approximately equals 8.6 billion Euros.

There are other natural resources that could help the regional economy revive and sustain; e.g. coal, silicon and dolomite. Coal may gain some attention if one develops low carbon mining technology and carbon-free coal energy conversion process. Dolomite has a great potential for region's growth since it is being used as raw material for magnesium (Mg). The demand for Mg rapidly increases with a trend of making products lighter, slimmer and smarter, e.g., electronic/electrical goods,

<sup>7</sup> A Survey on National Forest, Korea National Forestry Agency, 2005

<sup>8</sup> Estimated recently by Green Growth Research Center, Research Institute for Gangwon (RIG)

aircraft, telecommunication equipments, and especially fuel-efficient automobiles. The region is also rich with high-graded silicon. It is said that materials or substances, called poly-silicon, being extracted from silicon, can be used to activate solar power generator. Its demand will accelerate if the government actively helps promote solar energy industry.

These efforts notwithstanding, regional growth cannot be guaranteed unless monies earned within the region circulate internally. In other words, regionally-generated or accrued monies must be regionally circulated in order to stimulate regionally based businesses and investments. The Gangwon Branch of the Bank of Korea reported that over 28% of the financial assets accumulated within the region leaked out immediately through financial institutions, without being circulated intra-regionally.<sup>9</sup> Obviously monies move around for higher interest earnings, mostly to the SMA where money demand is greater and so is the rate of return. They run away from Gangwon province also because there exist relatively rare opportunities for sound investment as compared to SMA. In fact, the percentage rate of business loans made out to local firms by the local financial institutions is only 47%, substantially low as compared to those in SMA and even other regions (57%).<sup>10</sup>

### **Conceivable Green Growth Strategies: Promotion of Renewable Energy Production and Riding on Green Wave**

The province has pushed hard on locally and regionally initiated renewable energy production over the last 10 years as a part of effort to prepare for the age of environmental sustainability. The effort has resulted in production of renewable energy of 1.6 million mega watts per hour as of 2007. Most of it is generated by hydro electric power, wind power, bio mass and solar power as indicated in Table 9 below. It is most likely to be paid off as the country is moving toward low carbon or carbon free and green growth economy.

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<sup>9</sup>. Ibid pp. 15 - 16

<sup>10</sup>. Ibid p. 16

**Table 9. Production of Renewable Energy in Gangwon Province**

(Unit: mega watts/w%)						
	Total	Solar Power	Biomass	Wind Power	Fuel Cell	Hydro electric Power
Nation as a whole (A)	4,394,830 (100.0)	71,279 (1.6)	370,299 (7.0)	375,641 (8.5)	8,522 (0.2)	3,632,089 (82.6)
Annual growth Rate in % ('05-'07)	5.5	122.5	54.0	70.1	101.3	-0.6
Gangwondo (B)	1,549,934 (100.0)	4,476 (0.3)	- (0.0)	251,118 (16.2)	-	1,294,340 (83.5)
B/A% ratio	35.3	6.3	-	66.9	-	35.6
Annual growth rate in % ('05-'07)	27.0	91.5	-	258.3	-	17.3

Source: Development Potential for Renewable Energy Resources in Gangwon Province, Korea Energy Economy Research Institute, 2009

Potentially there remains much more room for further development of renewable energy and it is suggested that the province develops a five year renewable energy production plan with financial and technological support from the central government. According to a report by Korea Energy Economy Research Institute (also known as KERI) the province can generate 29,200 MW/h of additional energy through wind power, 908 MW/h through solar thermal power plant, and some more energy<sup>11</sup> through hydroelectric power.<sup>12</sup> Biomass is another major source of renewable energy because a large amount of animal and other wastes, e.g. wood pellet, methane gas, fishery and agricultural wastes are generated in the province.

The KERI report says that it would require a total of 1.2 trillion won (equivalent to 687.5million Euros) of new investment for the province to implement the 5-year renewable energy plan. The positive impacts would be tremendous; it will help reduce 1.3 million tons of CO<sup>2</sup>, not to mention a few thousands of newly created green jobs. Regional multipliers would range between 2.5 and 2.8 with big intra-regional linkage and trickle-down effects.

<sup>11</sup> The estimate figure was made by the Korea Nuclear and Hydroelectric Power Company Inc. located in Chunchon, but not officially confirmed.

<sup>12</sup> Report on Development Potential for Renewable Energy Resources in Gangwon Province, Korea Energy Economy Research Institute (known as KERI), 2009

Seemingly most immanent now is to identify, articulate, and develop technically and financially feasible local projects which can be integrated with, and incorporated into, the national green growth strategies. Some of them are readily conceivable. For example, in conjunction with, so called, Four Major River Cleaning and Restoration Projects at the central level, the province can come up with a number of river sustainability projects, involving cleaning and streamlining the upper basin of the South and North Han River to improve water quality and building water parks/recreation areas and water-borne resorts for tourist attraction.

The green transportation strategy is another one that can be integrated at the regional level as it involves modal shift from automobile to rail transportation, expansion of carbon free public transit system, e.g. battery or CNG operated buses, and development of fuel efficient automobiles. Also proposed are construction of bike roads and electrically powered East/West high speed railroad as planned for Winter Olympic Games. Gangwon province can also closely work with the government in water conservation strategy which emphasizes water storage and hydro electric power generation through building small and medium sized dams.

Most appealing to Gangwon province among the 10 high priority strategies seems to be rapid expansion of renewable energy production. The province already produces 67billion won (38.4million Euros) worth renewable energy and could double its production capacity if proper incentives are timely provided. The Five Year Energy Development Plan, if timely prepared, could gain momentum if such measures are taken simultaneously.

Equally important is the strategy being geared to greening homes, offices and schools. Gangwon province is suggested to work out four basic passive housing modules; hill house, sea-cliff house, lakeside house, and regular house reflecting Gangwon's natural settings, environmental characteristics and especially climate conditions. All these homes should be built and maintained with fuel efficiency in mind and depend largely on renewable energy. Similar efforts should be made with respect to green offices, public offices in particular, factories and school buildings. The greening effort of this kind will help local economy grow as it stimulates the construction sector.

Promotion of 'green businesses' is an integral part of the national strategy. If the government's incentive system materializes, Gangwon province must help them

prosper by all means. They are basically of four categories; renewable energy production, fuel efficiency technology development (both hardware and software), environmental sustainability businesses, including resource-reuse, -reduction, and – recycling businesses. ‘Medical conversion and tourism businesses’ could be added as they were designated by the government as leading industry for the province and much of the government fund will be released to help accelerate the growth of the industry.

### **Summary and Conclusion**

This paper has briefly examined the Gangwon’s regional economy and reviews various regional development program in terms of job and income creation and value added generated of each, with particular focus on knowledge-based and renewable energy industry. Some were successful, but many were not, and yet the local efforts to promote such environmentally sustainable projects will be gradually paid off as the government has decided to go for green growth strategies.

The paper strongly suggests that the province should draw upon its own green growth plan, emphasizing exploitation of its own natural resources, water, forest and tourism resources in particular; equally emphasized are the expansion of renewable energy production, the improvement of water quality, green transportation and logistics, green building and construction as well as the promotion of green businesses. The future of the province would depend a lot on how actively it responds to these new opportunities; should it lose this chance, the region’s future would be even gloomier.

More specifically, this paper suggests a major shift in regional development strategies in order to revitalize the Gangwon’s economy, calling for some action plans as follows;

1. Streamline the strategic industries in such a way that they could “commercialize” new technologies and knowledge accumulated over the years from R/D activities;
2. Reinforce the conventional industries, farming and tourism in particular, so that they can make the most of the scale economies and fast growing ‘new green markets’,

3. Be selective when inducing firms from outside; preferably the ones producing high value added parts and components, and with 'green and clean image';
4. Make the most of 'naturally endowed resources,' water, wind, forest, culture, and the nature itself as tourist attraction; and especially,
5. Ride on green wave to take advantage of government incentives and develop projects being integrated with, and incorporated into, the national green growth strategies.

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