

# Conservation Education by the Garang River Community Group

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**Abstract--** Land-use conversion effects is a known reflection on this issue, and the local people are less concerned with healthy watersheds, must incorporate well targeted education for the community.

This research purpose of identifying conservation activities and analyzing various forms of conservation education on the Garang River Community. Research subjects are the Garang river community, respondents were selected by a purposive sampling technique. Data were collected from a questionnaire, interviews, observation and analyzed quantitatively and qualitatively.

This research identified conservation activities as local wisdom developed from awareness of environmental issues, conservation education was delivered through the water management in the household, and educational strategies for the watershed conservation included integrated watershed management programs and activities that consisted of water system control, development of productive land according to carrying capacity and environmental capacity, and institutional development and community welfare improvement.

**Keywords:** Education – Community – Conservation of River.

## I. INTRODUCTION

Damages to watersheds in many places in Indonesia need to be addressed immediately, given that carrying capacity and environmental capacity are increasingly exceeded by population growth, urbanization, narrowing forest and water retention areas, sprawling soil degradation, and improperly planned regional development, all of which ultimately lead to more severe floods, landslides, and droughts (Nugroho, 2015). Data from the Ministry of Forestry shows that, initially, damages were found in 22 watersheds in 1984, but this figure increased to 39 in 1992 and 62 in 1998. Based on the Decree of the Minister of Forestry No. SK.328/Menhut-II/2009 issued on June 12, 2009, there are currently 108 degraded watersheds marked as priorities. Garang is among the watersheds in need of immediate management outlined in the medium-term development plan for 2010-2014. Causes of watershed degradation are, among other

things, a low level of community welfare, less optimal roles of relevant parties in watershed management, and lack of community participation.

According to Nugroho (2015), the key to successful river management is community participation, where the local people are involved and feel the direct benefit of river management activities. Environmental damages may arise from not only local physical and socio-economic problems but also disorganized institutional and legal functions as a regulator. Apart from the lack of intersectoral integration, regional egotism, which steers city/regency governments to feeling responsible merely for their respective administrative borders, also poses enormous challenges to watershed management in Indonesia. On the other hand, environmental management demands varying approaches that cross administrative boundaries like the principles of bio-regionalism because, in most cases, it encompasses different ecologies and geographies. Prevailing regional egotism correlates with the attitude of laying the responsibility for environmental damages on others (Hadi, 2005).

Semarang City is traversed by several major rivers, mainly Garang and Babon. Both rivers flow from Mount Ungaran with a very short distance, +40 km, to a very steep slope. In this upper zone, rapid land-use change from wet and dry agricultural fields to settlements and factories is prevalent. Even in the city, many water pockets are filled with excavated soils from the hills, which should function as water recharge and retention areas, to provide more space for housing. An overview of land-use conversion upstream shows a narrowing forest area from 23.28% of the total city area in 1995 to 18.38% in 2010, while the settlement area grew from 1.69% in 1995 to 7.41% in 2010. Instead of increasing to 30% per the provisions set in Act No. 41 of 1999 on Forestry, the forest area presented a downward trend from year to year. At this stage, the carrying capacity of the Garang and Babon watersheds declines to the point that imperils watershed sustainability. Rainwater, which should be able to

seep in and be stored in the soil, transforms into surface runoffs, increasing the risk of floods in the rainy season and droughts in the dry season. In the lower zone, especially the coastal areas stretching from Kendal to Demak, mangrove ecosystems are damaged due to the expansion of buildings and other infrastructure.

Strategies to improve integration in river management can be determined using the Analytical Hierarchy Process (AHP), which selects criteria and alternative strategies that are appropriate to the condition of existing resources. The first alternative priority is to prepare for a river management plan that is based on environmentally strategic areas by involving relevant parties. The spatial plan of Jawa Tengah Province has classified the Garang Watershed as a strategic area with an environmental function, which needs to be followed up with more detailed planning by accommodating upstream-downstream interests. The high number of agencies/institutions involved is an asset because existing programs and funding can support the realization of integrative management. Aligning the watershed with the administrative area is also essential to promote a comprehensive understanding of which parts of the watershed belong to every region and, consequently, clear division of roles of the parties. With this strategy, Garang Watershed management is hoped to be more integrated, and problems can be resolved by the participation of all relevant parties.

## II. METHODS

The Garang watershed has been designated as the focus of a pilot integrated river management project in the Presidential Instruction No. 5 of 2008. In this research, the targeted subjects were selected by random sampling from communities, regardless of gender, that had been directly involved in the scope of river performance. Respondents were preferably married and were representatives or agents associated with community empowerment in river restoration, especially officials at the sub-district/village, river community group members, and community figures. The research variables or focuses were community capacity and river quality. Primary data were acquired by direct observation in the field and structured interviews (to guide the interviews according to the research objectives), while secondary data were gathered by documentation and interviews with the research subjects. Quantitative analysis was performed to reveal the socio-economic-cultural conditions of the people associated with river restoration, and qualitative analysis was applied to interpret the effectiveness of community participation in river management, as a reference for designing forms of community empowerment through effective river education.

## III. RESULT AND DISCUSSION

### 3.1 Conservation activities of the Garang River Community Group

According to Setyowati (2018), the Garang river community group organized conservation activities in Lerep village, Ungaran Barat District, Semarang Regency. They involved tourism awareness groups (pokdarwis) and the population of Lerep village in promoting existing local wisdom called Iriban. Iriban is river or irrigation channel cleanup activities held with a custom event or tradition where the entire local community prays and eats together. It has been well-preserved by the entire community and has long been practiced by the young and adult male population in the village. Iriban is carried out once a year in August or September on Rabu Kliwon (certain Wednesdays that fall on a Kliwon day according to the Javanese calendar) right before and afternoon.

Nur 'Izzatul et al. (2018) suggest that the local wisdom of Sekaran Subdistrict, part of the upper zone, can reduce the rate of erosion. This cause-effect relationship is possible as farmers stamp on the soil (compaction) after planting and harvesting crops. Compared to the compact ground surface, soils that are abandoned or left loose after these stages of farming are more inclined to be washed away. Also, farmers use grass clippings and leaf litter from cassava trees for mulch that can prevent raindrops from directly contacting and segregating soils, scatter firewood ash to create friable soils that increase soil infiltration capacity and fertility, and place rocks on sloping agricultural land as a mechanical soil conservation strategy.

### 3.2 Forms of conservation education in the Garang River

Conservation education for community-based river management in the Garang Watershed had many forms, including water management and preservation in the neighborhood. For instance, rainwater falling on the yards of the residents is harvested so that it is retained in soil instead of immediately flowing into the river. Rainwater can be retained through natural infiltration or flowed into simple reservoirs (jogangan, i.e., holes created in soil) and infiltration wells. The combination of waste, spring, and groundwater management involved afforestation and annual tree crop planting around the springs. Meanwhile, small river management was centered on creating a retarding basin along river channels that stored water for a limited period of time before flowing down-stream, or in other words, small rivers in the upper zone functioned as a temporary natural polder for runoff or floods.

Another form of conservation education was the development of an agro-conservation model that involved farmers in the Garang Watershed. This effort focused on planting productive crops that

could increase household income. Accordingly, soil erosion mitigation and river conservation depend heavily on the awareness and role of the community in the upper zone in realizing agro-conservation.

### 3.3 Conservation education strategies for river preservation

Conservation education strategy to realize an integrated regional plan of Garang watershed that combines different regions, sectors, and stakeholders is increasing public awareness in its management. It adopts policies that optimize community counseling and education about watershed management and involve programs that regulate any permits or licenses of utilization that do not conform to the predefined spatial plan of Garang watershed. Short-term activities include the development of spatial-based licensing systems, supervision and control of permits/licenses of land utilization, and advocacy and counseling on Garang watershed management. Medium-term activities are the drafting of regional regulations on the spatial plan of the watershed (1 package), the formation and operation of a supervisory and licensing control body in the watershed (1 package), and human resource training in watershed management (5 packages). Long-term activities focus on human resource training in Garang Watershed management (10 packages).

Conservation education strategy adopted to preserve residential areas and public facilities is involving a broader community in afforestation that can create green open space (functioning as water infiltration and environmental preservation zone), tree plantation as protector, and restoration of regional ecosystems. These efforts are expected to increase CO<sub>2</sub> absorption in residential areas and public facilities with limited vegetation cover (<30%) and public green open space within the city/regency. In this case, the strategy requires policies that regulate environmental control in residential areas and public facilities and promote a balanced urban environment. Supporting programs are tree plantation and urban afforestation. Short-term activities include tree plantation (200 ha) and afforestation/reforestation of at least 15 ha of the watershed area. Medium-term activities are tree plantation (200 ha), urban afforestation (at least 15 ha), and urban forest maintenance throughout the watershed. Long-term activities include tree plantation (100-500 ha), urban afforestation (at least 15 ha), and urban forest maintenance throughout the watershed. The parties involved are the forestry services at the province/regency/city level, River Basin Research Station (BPDAS) Pemali Jratun, Environmental Impact Management Agency (BAPEDAL) at the regency/city level, community, and governments at the province/regency/city level.

To improve the quality of the environment means to prevent environmental damage and pollution on land, water, air, and maintain a clean and healthy environment for the people. For this

purpose, the conservation education strategy adopted is bettering waste treatment and develop environmentally-friendly industrial technology in riparian areas. In this context, environmental quality can be achieved by educating the local community on watershed rehabilitation and conservation. Therefore, it requires policies that regulate waste management improvement and the application of environmentally friendly industrial technology in riparian areas, increase coordination in environmental management at the province/regency/city level and efforts to control and manage environmental impact due to development activities, and raise public awareness of environmental issues so that the local community can play an active role in monitoring environmental quality and restoring the condition upstream (social control). Relevant conservation education programs thereby include environmental pollution and damage control and the rehabilitation and restoration of natural resources and reserves. Short, medium, and long-term activities include the development of environmentally friendly technologies (including traditional/conventional technologies in natural resource management), waste management, and environmentally friendly industrial technology and the rehabilitation of the upper zone to ensure the availability of agricultural irrigation water supply and prevent erosion and sedimentation in the watershed and coastal areas. The parties involved are environmental agency at the province level, office of public works, human settlement, and spatial planning, forestry services, perhutani (a utility company), and governments at the regency/city level.

Conservation education strategies adopted to empower community are (1) increasing the capacity of human resources, local institutions, and community's understanding and participation in maintaining water quality, (2) encouraging community, officials, and agencies to develop positive attitudes toward water conservation, (3) creating incentive and disincentive mechanisms for water management, (4) raising community's support to watershed management, provision of costs for planning, construction, supervision, and operation and maintenance activities so as to increase community's capacity and participation in conservation, (5) protecting water resources through social engineering and legislation, (6) improving the function of water resources or water availability and quality, (7) encouraging community's participation in water management and roles in planning, construction, supervision, operation and maintenance of irrigation infrastructure. These efforts need policies that (1) focus on economic empowerment of the community in and around forest areas and sustainable support for the legal system and officials that can gradually address natural resource and environmental issues, (2) encourage cooperation in the enforcement of

existing regulations through persuasive or cooperative efforts, (3) increase the community's participation in water conservation, supported by good coordination between relevant officials and institutions, (4) disseminate the strategies to riverbank communities and other stakeholders, (5) introduce incentive and disincentive systems gradually to encourage efficient use of water and control water pollution, (6) create a conducive atmosphere conducive for the excellent cooperation and coordination in water resource management, and (7) empower and improve the economy of communities living around forests, rivers, reservoirs, and springs.

Relevant conservation education programs thereby include the protection and conservation of natural resources, activities to encourage the community to always provide support in addressing water resource and environmental issues, law enforcement, community involvement in river maintenance, dissemination of efforts to maintain water quality, implementation of water rate policies, consistency in synchronizing the implementations of legal documents (e.g., acts and presidential regulations) with existing Regional Regulations and Governor Decrees, and provisions of financial aid for the livelihood of the communities living around forests, rivers, reservoirs, and springs. Short, medium, and long-term activities include conservation field schools for the community, a master plan for community empowerment or village conservation model, training on skill improvement, aids for villages, counseling and assistance, community encouragement to always provide support in dealing with water resource and environmental issues, enforcement of conservation violation codes (e.g., illegal logging), community involvement in controlling illegal sand mining operations and buildings on riverbanks, dissemination of efforts to maintain water quality through public service announcements on television, radio and newspapers, application of economic instruments to save water use by commercial groups (e.g., water rate policies), the establishment of coordination between various stakeholders, and provisions of financial aid for the livelihood of the communities living around forests, rivers, reservoirs, and springs.

The parties that play crucial parts in these strategies are the Forestry, Agriculture and Plantation Services, the Industrial Services at the province/regency/city level, River Basin Research Station (BPDAS) Pemali Jratun, Perhutani (a utility company), governments at the province/regency/city level, Regional and Municipal Police, District Court, Public Prosecution Services, community, NGOs, Watershed Main Station (BBWS) Pemali Juana, Water Resource Management Services (PSDA) of Jawa Tengah Province, Office of Public Works for Irrigation at the regency level, Directorate General

of Natural Resources, the Forestry Services at the province/regency/city level, and Environmental Impact Management Agency (BAPEDAL) at the regency/city level.

In the community, conservation education serves not only as a facilitator but also as an activator that produces knowledge and competency.

#### IV. CONCLUSION

Conservation activities of the Garang River Community Group include Iriban, sedekah dusun, and river cleanup (community services) for the communities of Lerep Village, Ungaran Barat District, and local wisdom to reduce the rate of erosion by stamping on soil, using grass clippings and leaf litter for mulch, scattering firewood ash on soil, and placing rocks on sloping agricultural land for the communities of Sekaran Subdistrict, Gunungpati District.

Forms of conservation education for community-based river management are water management and conservation in the neighborhood, waste management, spring and groundwater management, small river management, and the development of an agro-conservation model.

Community conservation education strategies in the Garang Watershed have been realized in various watershed management programs and activities. The strategies adopted are raising public awareness of watershed management, involving the broader community in afforestation, increasing waste management and environmentally friendly industrial technology in riparian areas and watershed rehabilitation and conservation, increasing the capacity of human resources and community institutions, encouraging the community, officials, and agencies to develop positive attitudes towards water conservation, increasing community's understanding and participation in maintaining water quality, introducing incentive and disincentive mechanisms for water management, and encouraging the community to support watershed management and provide costs for planning, construction, supervision, operation and maintenance activities.

#### REFERENCES

- [1] Asdak: Hidrologi dan Pengelolaan Daerah Aliran Sungai. Gadjah Mada University Press, Yogyakarta (2010)
- [2] Awang, S. A: Pemberdayaan Masyarakat dan Kebijakan Deliberative. Laboratorium Ekologi Sosial dan Politik Sumberdaya Hutan (ESPSDH) Pascasarjana Program Studi Ilmu Kehutanan UGM, Yogyakarta (2008)
- [3] Dewi Indrawati: Pemberdayaan Masyarakat dalam Pengelolaan DAS Mikro. Konsep dan Implementasi Peraturan Menteri Pertanian

- Nomor 82/Permentan/OT.140/8/2013. Pedoman Pembinaan Kelompok Tani dan Bagungan Kelompok Tani. Departemen Pertanian, Jakarta (2013)
- [4] DFID: Sustainable Livelihoods Guidance Sheets. Department for International Development (UK), London (2018)
- [5] Direktorat Jenderal SDA: Studi Penanganan Sedimentasi Waduk Serba-guna Wonogiri. Laporan Akhir Sementara. Volume II Laporan Utama JICA. Departemen Pekerjaan Umum, Jakarta (2007)
- [6] Frimansyah, H: Tingkat Keberdayaan Masyarakat dalam Program Pemberdayaan Masyarakat di Kota Banjarmasin dan Kabupaten Tanah Laut. Vol. 2(1), pp. 53-67. *Jurnal Agribisnis Perdesaan, Indonesia*(2012).
- [7] Hadi, A: Prinsip Pengelolaan Pengambilan Sampel Lingkungan. PT Gramedia Pustaka Utama, Jakarta (2007)
- [8] Hikmah, Nur 'Izzatul, Lu'lu'il Munawaroh, and Tegar Nugraha Satya Wibawa: Kearifan Lokal Petani Di DAS Garang Hulu Semarang Untuk Mengurangi Laju Erosi. *Prosiding Seminar Nasional Geografi UMS IX 2018*, pp. 535-542 (2018).
- [9] Ife, J. and Tesoriero, F: *Community Development-Community Based Alternatives in an Age of Globalisation*. Third edition. Pearson Education, Australia(2006)
- [10] Indrawati, D.R., Adi, R. N., Subaktini, D., and Kusumedi, P. Analisis Tipologi Sosial dan Pengaruhnya terhadap Kinerja Daerah Aliran Sungai. *Laporan Hasil Penelitian Balai Penelitian Kehutanan*. Badan Litbang Kehutanan, Solo (2009)
- [11] Karsidi, R. Pemberdayaan Masyarakat Petani Dan Nelayan Kecil. *Semiloka Pemberdayaan Masyarakat Di Jawa Tengah Dalam Rangka Pelaksanaan Otoda*. Badan Pemberdayaan Masyarakat Jateng. 4-6 Juni 2002. Retrieved on March 12, 2015, from <[http://eprints.uns.ac.id/783/1/195707071981031006ravik\\_1.pdf](http://eprints.uns.ac.id/783/1/195707071981031006ravik_1.pdf)>, Semarang (2002)
- [12] Kartasapoetra, A.G: *Teknologi Penyuluhan Pertanian*. Bumi Aksara, Jakarta 2001
- [13] Kartasasmita. G: *Pemberdayaan Masyarakat. Konsep Pembangunan yang Berakar pada Masyarakat*. Sarasehan DPD Golkar Tk. I Jawa Timur. Retrieved on August 12, 2011. <<http://www.ginandjar.com/public/09PemberdayaanMasyarakat.pdf>>. (1997)
- [14] Mardikanto, T: *Sistem Penyuluhan Pertanian Surakarta*. Sebelas Maret University Press, Surakarta (2009)
- [15] Marlana, Bekt: *Kajian Pengelolaan DAS Garang Untuk Memenuhi Kualitas Air Sesuai Dengan Peruntukannya*. Master Thesis. Program Pasca Sarjana Universitas Diponegoro, Semarang (2012)
- [16] Martopo, A., Hardiman, G., Suharyanto, S: *Strategi Penghidupan Berkelanjutan (Sustainable Livelihood) di Kawasan Dieng (Kasus di Desa Buntu Kecamatan Kejajar Kabupaten Wonosobo)*. *Ekosains*. Vol. 5(2) (2013)
- [17] Mungmachon, M.R: *Knowledge and local wisdom. community treasure*. *International Journal of Humanities and Social Science*. Vol. 2(13), pp.174-181 (2012)
- [18] Nawir, A.A., Murniati and L. Rumboko: *Rehabilitasi Hutan di Indonesia. Akan Kemanakah Arahnya Setelah Lebih dari Tiga Dasawarsa*. CIFOR. Retrieved on December 14, 2013. <[http://www.cifor.cgiar.org/publications/pdf\\_less/books/B.Nawir\\_0801Ina.pdf](http://www.cifor.cgiar.org/publications/pdf_less/books/B.Nawir_0801Ina.pdf)> (2008)
- [19] Ohno, T, Tanaka, T. and Sakagami, M: *Does Social Capital Encourage Participatory Watershed Management? An Analysis Using Survey Data From the Yodo River Watershed*. *Society and Natural Resources*. Vol. 23, pp. 303-321(2010)
- [20] Peraturan Menteri Kehutanan Republik Indonesia Nomor: P.29/Menhut-II/2013. *Pedoman Pendampingan Kegiatan an Pembangunan Kehutanan*. Departemen Kehutanan, Jakarta (2013)
- [21] Pawarti, A, September. *Nilai Pelestarian Lingkungan dalam Kearifan Lokal Lubuk Larangan Ngalaung Agung di Kampuang Surau Kabupaten Dharmasraya Provinsi Sumatera Barat*. In *Seminar Nasional Pengelolaan Sumberdaya Alam, Sumatera Barat* (2012)
- [22] Pramono, I.B., Purwanto, and Indrawati, D. R. *Pola Agroforestry Pada Lahan Miring (PALM) Untuk Mendukung Ketahanan Pangan dan Kelestarian Lingkungan*. *Laporan Hasil Penelitian DIKTI*. Balai Penelitian Kehutanan, Surakarta (2009)
- [23] Pudjiyanto, K: *Partisipasi Masyarakat Dalam Rehabilitasi Hutan, Lahan dan Konservasi Sumberdaya Air di Sub DAS Keduang, Daerah Hulu DAS Bengawan Solo*. Master Thesis. Pascasarjana IPB. Rahayu, E.S. 2007. *Analisis Sosial Ekonomi Masyarakat Terhadap Kelestarian Waduk Wonogiri*. *KONPERNAS PERHEPI*. Vol. 07. Pp. 34-48 (2007)
- [24] Setyowati, Dewi Liesnoor, Puji Hardati, and Triwathy Arsal: *Konservasi Sungai Berbasis Masyarakat Di Desa Lerep DAS Garang Hulu*. *Prosiding Seminar Nasional Geografi UMS IX 2018*, pp. 401-410 (2018)
- [25] Subejo and Supriyanto: *Metodologi Pendekatan Pemberdayaan Masyarakat*. Short Paper disampaikan pada *Kuliah Intensif Pemberdayaan Masyarakat Pedesaan*. Study On Rural Empowerment (SOREM). Dewan Mahasiswa Fakultas Pertanian UGM on May 16, 2004. *Faperta UGM, Yogyakarta* (2004)

- [26] Suhandini, Purwadi: Perilaku Masyarakat Terhadap Penggunaan dan Pelestarian Air di Lingkungannya (Studi Kasus di Daerah Aliran Sungai Garang, Semarang). *Forum Ilmu Sosial*. Vol. 35(1), pp. 38-47 (2008)
- [27] Surat Keputusan Menteri Kehutanan Nomor SK.132/Menhut-II/2004. Pedoman Umum Penyuluhan Kehutanan. Departemen Kehutanan, Jakarta (2004)
- [28] Sutrisno, J., Sanim, B., Saefuddin, A., and Sitorus, S.P.P: Arahan Kebijakan Pengendalian Erosi Dan Sedimentasi Di Sub Daerah Aliran Sungai Keduang Kabupaten Wonogiri. *Sains Tanah – Jurnal Ilmiah Ilmu Tanah dan Agroklimatologi*. Vol. 8(2), pp.105-118 (2011)
- [29] Undang-undang No. 7 Tahun 2004 tentang Sumber Daya Air.
- [30] Widyaningsih, I. W: Pengaruh Perubahan Tata Guna Lahan Di Sub Das Keduang Ditinjau Dari Aspek Hidrologi. Master Thesis. Program Pascasarjana Universitas Sebelas Maret, Surakarta (2008)
- [31] Wrihatnolo, R. R. and Dwidjowijoto, R. N: Manajemen Pemberdayaan. Sebuah Pengantar dan Panduan Untuk Pemberdayaan Masyarakat. Alex Media, Jakarta (2007)