ABDIMAS: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang
Vol.10(1) February 2025, 37-45
p-ISSN: 2721-138X e-ISSN: 2548-7159
http://jurnal.unmer.ac.id/index.php/jpkm

LPPM
UNMER
MALANG

Water table depth optimisation solutions to prevent peat fires in the Kapuas River

Rossie Wiedya Nusantara, Urai Edi Suryadi, Tino Orciny Candra, Ari Krisnohadi

Department of Soil Science, Faculty of Agriculture, Universitas Tanjungpura
JL. Prof. Hadari Nawawi, Pontianak, West Kalimantan, 78124, Indonesia

ARTICLE INFO:

Received: 2024-10-04
Revised: 2024-11-22
Accepted: 2025-01-04
Published: 2025-02-28

Keywords:

Canal blocking, Peat, Rewetting, Water table

ABSTRACT

The optimisation of water table management is a significant strategy to prevent the risk of fire and peat subsidence. Peatlands, unique ecosystems, are frequently damaged by drainage due to human activities. The hydrological restoration program aims to protect and manage peat ecosystems, thereby contributing to the enhancement of the resilience of fire-free villages. The success indicators of peat rewetting can be indicated by a shallow water table and a slow rate of subsidence. The objective is to optimise the water table management to prevent fires and subsidence, while increasing community awareness of its importance in agriculture. The implementation of Community Service Activities was conducted in Punggur Kecil Village, involving the Farmer Group in Parit Toom Jaya and the Fire Care Community Parit Rahmat group in the Kapuas River-Punggur Besar River Peat Hydrological Unit. These activities included socialization, educational sessions, and field visits to peatlands to gain insight into the concept of peat rewetting techniques. Practical training was also provided on measuring and monitoring water tables, followed by regular evaluations to assess progress. This strategy not only enhances agricultural productivity but also reduces fire risks and land subsidence, providing a sustainable, long-term solution for peatland ecosystem management.

How to cite: Nusantara, R. W., Suryadi, U. E., Candra, T. O., & Krisnohadi, A. (2025). Water table depth optimisation solutions to prevent peat fires in the Kapuas River. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang, 10*(1), 37-45. https://doi.org/10.26905/abdimas.v10i1.14418

1. INTRODUCTION

It is estimated that approximately 45 percent of tropical peatlands are located in Indonesia, with the remainder distributed across various countries in Southeast Asia (Malaysia, Brunei, Vietnam, the Philippines, Papua New Guinea and Thailand), Africa, the Caribbean, Central America and South America (Page et al., 2009; Page et al., 2011). Peatlands in Indonesia amount to 14.9 million hectares, with the majority distributed across the islands of Sumatra, Kalimantan, and Papua. The peatland area in West Kalimantan reaches 1.68 million hectares, representing 11.3 percent of the total land area (Agus et al., 2016; BBSDLP, 2011).

Peatlands are particularly susceptible to damage and degradation, particularly when they are used for agricultural purposes. The clearance of peatlands gives rise to a number of environmental concerns, particularly in view of the fact that peatlands represent the largest store of soil carbon and a significant water sink. The carbon stored in peatlands is inherently unstable and can be readily emitted when

✉ Corresponding Author: **Rossie Wiedya Nusantara**: Tel. +62 561-736033 | E-mail: rossie.wiedya.n@faperta.untan.ac.id

peatlands are subjected to excessive drainage and remain in an open state. Furthermore, peatlands serve an additional function in the storage of water and the conservation of biodiversity (Agus, 2011; Sabiham et al., 2012).

The productivity of peatlands is contingent upon the manner in which they are managed and the actions of humans. A number of researchers have indicated that peatland productivity has diminished as a consequence of the deterioration of soil fertility, physical and biological properties (Masganti, 2014; Maftuah & Indrayati, 2014). A degraded peatland is defined as land that has experienced a decline in its capacity to perform the functions for which it was originally intended, whether environmental (hyrdrology, carbon storage, and biodiversity) or economic (as cultivated land). The process of peatland degradation is caused by a number of inappropriate land use activities, one of which is the drying out of the land, which renders it susceptible to recurrent fires in peat locations. The most effective method for restoring the function of the peat ecosystem is through the process of peat restoration. The restoration of peat ecosystems for cultivation purposes is achieved through the rewetting of peatlands, which is facilitated by the construction of canal blocking structures.

The national restoration programme was established by the President of the Republic of Indonesia in accordance with Presidential Regulation No. 1/2016, namely the Peatland Restoration Agency (BRG). The provinces of Riau, South Sumatra, Jambi, West Kalimantan, Central Kalimantan, South Kalimantan, and Papua have been identified as the priority areas, collectively encompassing an estimated 2.6 million hectares. Peat restoration is defined as an effort to restore degraded peat ecosystems to a state where their hydrological condition, structure and function are restored. In order to achieve this, the rewetting of peat material that has dried out as a result of the lowering of the peat water table is carried out by constructing water-retaining structures in the form of canal blocking. According to Triadi (2020) and Alfarisyi et al. (2020), this can be an effective method for increasing and maintaining the water table.

Peat restoration efforts by the Peat and Mangrove Restoration Agency have been ongoing for approximately six years. Nevertheless, hydrological restoration in the form of rewetting remains a crucial necessity, particularly in Kubu Raya Regency, which encompasses an area of 526,196 hectares, representing approximately 33.3 percent of all peatlands in West Kalimantan Province. Despite the assertion in some literature that peat restoration has yet to yield a tangible positive impact on the peat ecosystem, it is imperative to persist in efforts to reinforce this process, particularly within the Kapuas-Sungai Punggur Peat Hydrology Unit. This is crucial for the benefit of communities residing in the Peat Hydrology Unit region, who are uniquely positioned to perceive and experience the direct consequences of restoration activities.

It is evident that education and community involvement play a pivotal role in optimising the water table. It is imperative that local communities are educated about the significance of preserving peat ecosystems and the detrimental effects of soil drainage (Aulia et al., 2023). Training and socialization programmes can facilitate the dissemination of knowledge and encourage active community participation in the preservation and sustenance of peatlands (Rachmawati & Tarigan, 2019). In order to achieve optimal community empowerment, it is essential to provide comprehensive and extensive socialization of technology (Nugroho et al., 2017). Furthermore, the assistance provided must be readily accepted and effectively utilised by the community as a catalyst for the success of development programmes that will be implemented by the community or community groups (Rachmawati & Tarigan, 2019).

It is also imperative that the government, non-governmental organisations and the private sector collaborate in order to achieve the objective of optimising water table (Malihah, 2022). The formulation and implementation of policies supportive of sustainable water resource management at the community level must be based on local wisdom values (Weningtyas & Widuri, 2022). The objective of this

undertaking is to achieve the optimisation of water table management, with the dual aim of preventing fires and subsidence, also increasing public awareness and understanding of the importance of water table management in agricultural cultivation.

2. METHODS

The implementation of Community Service Activities in Punggur Kecil Village in a farmer group in Parit Toom Jaya and a Fire Care Community group in Parit Rahmat in the Kapuas River-Sungai Punggur Besar Peat Hydrologycal Unit (Figure 1). The rationale behind the selection of these two locations was their proximity to Pontianak City and the fact that they were situated in the canal block construction assistance (R1) and the revitalisation of the community economy in the form of seed assistance, agricultural tools, and the strengthening of farmer groups (R3), which were provided by the Assistance Task of the Peat and Mangrove Restoration Agency in 2024. The activities were initiated in May 2024 with a survey of the location of the activities, followed by monitoring of the depth of the water table from July to September 2024, and socialization and education were conducted in both locations in August and September 2024.

The Implementation of Activities

The implementation of Community Service Activities is comprised of several stages, they are: (1) Activity planning, Socialization and education programme, and implementation of water table management technology.

Activity planning

Plans made before the activity held are: (1) Identification of locations in the form of determining the locations of peatlands that are prone to fire and require solutions to optimise the water table. The location of this Community Service Activities is contingent upon the preparedness of the farmer groups and Fire Care Community groups in Punggur Kecil Village, as well as the efficacy of the implementation of economic revitalisation activities (R3), which will entail the cultivation of horticultural crops (ginger, chilli, cucumber, watermelon) from the Assistance Task of the Peat and Mangrove Restoration Agency in 2023; (2) A comprehensive needs analysis will be conducted through surveys and consultations with local communities and relevant stakeholders to ascertain the actual condition of the water table and the level of fire risk.

Socialization and education programme

The socialization and education programme held, as well as visits to peatlands that includes counselling for communities and farmers on: (1) The necessity of regulating the water table in peatlands, encompassing the potential of peatlands, the risk of drought, and fire; (2) The application of rewetting techniques as a solution to optimise the water table, such as the deep wells or the canal blocking in order to maintain the stability of the water table; (3) Village readiness efforts to enhance the well-being of communities that employ peatlands as agricultural land. The socialization activities were conducted on the community group's agricultural premises (Farmer group and the Fire Care Community group) and at the residences of the group leaders.

The implementation of water table management technology

Periodic measurement of water table using a simple device, namely a piezometer, at several selected locations. These were six points in Parit Toom Jaya and four points in Parit Rahmat. The water table measurements were conducted on a twice-weekly basis from 3 July to 14 September 2024. The

measurement period commenced at 09:00 and concluded at 12:00 noon for the two planned canal block construction sites.

Figure 1. Piezometer

The preparation of a canal blocking plan or drainage system to control and maintain water table. The provision of assistance to local farmer groups and the Fire Care Community members is intended to facilitate an understanding of the design of the canal block and the necessity for building materials. It will also address the readiness and commitment of members, as well as the schedule for completion. The teaching of members will encompass the techniques of measuring and monitoring the depth of the water table and assessing the condition of the peatland based on visual indicators. This is with a view to ensuring that the water table remains at a safe level and in line with requirements.

Monitoring and Evaluation

Monitoring and evaluations are conducted on a regular basis to evaluate the efficacy of the programme and ascertain whether the water management techniques employed have a favourable impact on peat agricultural land. Furthermore, the construction of canal blocks at the two sites, which commenced at the conclusion of August 2024, is also monitored.

Report Writing and Publication

The activity report is in the form of a final report on the service activity, which covers all stages, results, and impacts obtained from the activity. The results are published in the form of sharing results and recommendations through local seminars or scientific publications, with the aim of increasing understanding of water table management.

3. RESULTS AND DISCUSSION

Results

The socialization and counselling activity on the topic of 'Solutions for Optimising Groundwater Levels to Prevent Peat Fires in the Kapuas River - Punggur Besar River KHG' was conducted as a means of exchanging knowledge between farmer groups and Fire Care Communities and the PKM DIPA Tanjungpura University Team in 2024. The activity was conducted in two phases. The initial phase commenced on 29 June 2024. The objective of this activity is to: (1) As a means of exchanging knowledge between peat farmers in West Kalimantan Province; and (2) to raise awareness about the stabilisation of rewetting efforts in the area where they live and their agricultural businesses. Additionally, the objective

was to assist the local government (relevant agencies) as partners in peatland fire control and to develop a community empowerment work plan to achieve goals at the community level. The implementation of this activity was carried out in two locations: the house and farmland of the Head of the Toom Jaya Farmer Group and the Punggur Kecil Fire Care Community.

The involvement of the local community is of paramount importance in the implementation of this service activity, as it is essential to guarantee the efficacy of water management practices and to prevent forest and land fires on peatlands. As a result of intensive educational initiatives, farmers and local communities have come to recognise the importance of maintaining optimal water table in order to prevent the occurrence of droughts and fires. The utilisation of water table monitoring tools has had a beneficial effect, with farmers now able to ascertain the optimal time for irrigation or the management of waterways to prevent the excessive flow of water out of the peatland. The regular measurement of the water table, particularly in periods of drought, represents an effective early-warning system for the prevention of peatland drought. It has been demonstrated that such monitoring enables the maintenance of soil moisture at an optimal level. The outcomes of the community service activities that have been conducted.

Socialization and education, as well as visits to peatlands. **It also comprised counselling for communities and community groups on water management on agricultural land**

The counselling addressed several important aspects, including: (1) Introduction to water management and its impact on land productivity. Participants were provided with a comprehensive overview of the significance of effective water management practices on agricultural lands. The session delved into relationship between water management and soil fertility, crop productivity, and the prevention of land degradation. This encompassed an in-depth analysis of the potential consequences of inadequate water management, including the risks of land damage such as erosion, flooding, and drought. The session concluded with a question-and-answer session, during which each farmer group was given the opportunity to inquire about and discuss the challenges they encounter in managing water on their land; (2) Field practice. In addition to theoretical counselling, field practice was conducted in farming areas to demonstrate the practical application of water management techniques. Participants were instructed in the installation and maintenance of drainage canals, the construction of basic dykes, and the monitoring of soil moisture levels; (3) Assessment of community participation and response. The activity was well-received by participants, who indicated that they had gained valuable insights through the counselling sessions and felt more equipped to implement effective water management strategies on their farms.

Figure 2. Socialization and counselling to community's group
Figure 3. Canal in cultivated land

Measurement and monitoring the water table and canal water level

The depth of the groundwater table was measured at two locations: Parit Toom Jaya comprising six piezometer points and Parit Rahmat with four piezometer points. The results are presented in Table 1.

Table 1. The results of water table measurements

Date of Measurement	Water Table (cm) at each location									
	Parit Toom						Parit Rahmat			
	SK1 T1	SK1 T2	SK1 T3	SK1 T4	SK1 T5	SK1 T6	SK2 T3	SK2 T4	SK2 T5	SK2 T6
JULY										
03-Jul-24	35	26	35	30	26	29	-	-	-	-
06-Jul-24	31	30	33	27	25	30	65	32	37	40
10-Jul-24	38	30	37	48	29	32	64	26	43	37
13-Jul-24	31	25	34	26	14	28	53	33	37	39
17-Jul-24	40	32	36	31	34	35	67	38	47	49
20-Jul-24	44	35	42	32	37	40	69	44	50	52
23-Jul-24	44	38	45	37	38	40	71	42	50	52
27-Jul-24	48	35	31	41	36	42	71	44	51	50
AUGUST										
11-Aug-24	46.5	42	46	37.2	39.8	44.2	43	46	52	51
15-Aug-24	25	19.5	32	24	21.5	23	32.5	21	34	29
24-Aug-24	28	20	29	20	15	17	38	15	34	33
27-Aug-24	24.5	17	27	19	14	16	38	9	31	30
31-Aug-24	29	20	29	21	16	19	40.5	14	33	30
SEPTEMBER										
03-Sep-24	34	26.5	28	23	23	24	42	39.5	23	33
07-Sep-24	40	29	35	27	28	30	44	30	44	37
10-Sep-24	20	17	25	16	11	13.5	38	7	29	8.5
14-Sep-24	33	23	31	23	21.5	25	41.5	21	40	32
17-Sep-24	35	27	34	26	27	28	42	27	45	39
22-Sep-24	33	25	32	25	24	27	30	25	44	33

*(-) = Due to heavy rainfall conditions, no measurements were taken.

The results of the measurement (table 1) indicate that the water table is less than 40 cm (0.4 metres), which is an optimal condition for agricultural peatlands and does not include degraded cultivated peatlands (Peraturan Pemerintah Republik Indonesia Nomor 71 Tahun 2014). This has a direct impact on reducing the risk of fire and decreasing the rate of subsidence. However, at certain measurement times on 20 July, 23 July, 27 July and 11 August 2024, almost all measurement points exhibited water table depth values in excess of 40 cm. The data from the Supadio-Pontianak Meteorology, Climatology and Geophysics Agency indicate that precipitation levels were relatively low on these dates. In contrast, the measurement dates of 3 July, 15 August, 24 August, 27 August, 31 August and 3 September 2024

exhibited water table depths of less than 40 cm, accompanied by medium-high rainfall intensity. The measurement results from the beginning of July to the end of September 2024 indicate that the water table depth at measurement points SK2T3, SK2T4 and SK2T5 is greater than 40 cm. These three points are situated in Parit Rahmat. This indicates that during periods of low rainfall (the dry season), it is essential to collect water in canals or ditches with the intention of retaining it on the surrounding land, thereby ensuring a relatively shallow water table depth and maintaining the moisture content of the peat soil.

Discussion

The effective water management on agricultural land is crucial for maintaining ecosystem balance and increasing agricultural productivity (Lasaiba et al., 2020). The objective of this counselling activity is to enhance the community's comprehension of the significance of effective water management. This will ensure the availability of sufficient quantities of water not only for plant growth (Purnomo & Puspitaloka, 2020) while simultaneously preventing the occurrence of various land damages, including floods and droughts. The efficacy of the canal block function can be gauged by observing the variation in canal water levels between the upstream and downstream sections of the canal. The differential in canal water elevation suggests that the upstream region of the canal is capable of retaining water, particularly during periods of low precipitation. Conversely, during the rainy season, the flow of water from the upstream to the downstream canals occurs at a rapid rate.

One of the challenges encountered by community groups engaged in water management is the limited technical knowledge and the paucity of available tools. The counselling provided successful practical solutions that can be implemented at low cost but are still effective (Zunaidi, 2024), including drainage arrangements and canal blocking. The success of this activity is contingent upon the active participation of the community in the maintenance of the water management system that has been implemented in the peatland.

It is anticipated that enhanced capacity in peatland water management will lead to increased productivity and resilience to climate change in the future (Purnamayani et al., 2022). Furthermore, it can facilitate soil and water conservation initiatives and promote more sustainable agricultural practices. The counselling activity proved instrumental in enhancing the community's comprehension of the significance of effective water management for enhancing agricultural yields and sustaining the sustainability of the farmland ecosystem (Rahman et al., 2023).

This socialization activity is an attempt to enhance community awareness of the utilisation of peatlands for activities within the agricultural sector. Community participation, as a form of engagement, must facilitate an increase in the community's capacity to utilise natural resources in a manner that does not compromise the integrity of the peat ecosystem or the surrounding environment. Furthermore, it can facilitate the creation of employment opportunities and business prospects, thereby enhancing community welfare (Pohan et al., 2023). The stages of community involvement in sustainable peatland management and utilisation can be adapted to align with the core programmes in order to enhance the overall quality of the peat ecosystem. Two farmer groups and the Fire Care Community in Punggur Kecil Village represent the community involvement. The community's enthusiasm for peat restoration efforts in (R1) manifested as the canal blocking in their agricultural locations. This was expected to have a positive impact on agricultural land moisture, especially during the dry season, and to minimise dry peat, which is particularly vulnerable to peat fires. By the conclusion of this activity, there was a discernible enhancement in the comprehension of the village community, the capacity of the farmer group management, and the fire care community to rewetting efforts in the peat restoration and fire

prevention initiatives being implemented in the Punggur Besar-Sungai Kapuas River Peat Hydrologycal Unit, particularly in Punggur Kecil Village.

4. CONCLUSION AND RECOMMENDATIONS

In order to prevent the occurrence of peat fires and subsidence, it is recommended that optimising the water table should be a priority in environmental policy. With an integrated and participatory approach, it is hoped that the peat ecosystem can be protected and its sustainability maintained for future generations. Recommendations that need to be implemented include: (1) It is essential to facilitate the capacity of farmers to adopt technological innovations and to enable their adaptation to economic development. (2) Further research is required to gain a more comprehensive understanding of the subject matter. This should include research into the application of adaptation technology, community development, and the role of cooperation between communities, entrepreneurs, and the government.

REFERENCES

Agus, F. (2011). Environmental and sustainability issues of Indonesia agriculture. *Jurnal Litbang Pertanian, 30*(4), 140-147. https://doi.org/10.21082/jp3.v30n4.2011.p140-147

Agus, F. M., Anda, A., Jamil, A., & Masganti. (2016). *Lahan gambut Indonesia: Pembentukan, karakteristik, dan potensi mendukung ketahanan pangan* (Rev. Edition). IAARD Press.

Alfarisyi, H., Sutikno, S., & Rinaldi. (2020). Analisis pembasahan lahan gambut akibat pembangunan sekat kanal (Studi kasus: Desa Lukun, Kabupaten Kepulauan Meranti). *Jurnal Teknik*, *14*(1), 45-52. https://doi.org/10.31849/teknik.v14i1.3347

Aulia, M. R., Siregar, M. P. A., Fachruddin, Sufriadi, Agustiar, & Safrika. (2023). Edukasi water management kepada masyarakat: Mencegah kebakaran lahan gambut dan pemanfaatan lahan gambut untuk pertanian di Desa Kuta Padang Kabupaten Aceh Barat. *IKHLAS: Jurnal Pengabdian Dosen dan Mahasiswa*, *2*(2), 56-62. https://doi.org/10.58707/ikhlas.v2i2.657

Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian (BBSDLP). (2011). *Peta lahan gambut Indonesia skala 1:250.000 edisi Desember 2011*. IAARD Press.

Lasaiba, M. A., Ansiska, P., & Riry, R. B. (2023). *Peran penggunaan lahan dalam perspektif peranian berkelanjutan*. Insight Mediatama.

Maftuah, E., & Indrayati, L. (2014). The use of biochar for improve soil properties and growth of paddy in peatland. *AGRIVITA Journal of Agricultural Science*, *35*(3), 290-295. https://doi.org/10.17503/Agrivita-2013-35-3-p290-295

Malihah, L. (2022). Tantangan dalam upaya mengatasi dampak perubahan iklim dan mendukung pembangunan ekonomi berkelanjutan: Sebuah tinjauan. *Jurnal Kebijakan Pembangunan*, *17*(2), 219-232. https://doi.org/10.47441/jkp.v17i2.272

Masganti, M., Wahyunto, W., Dariah, A., Nurhayati, N., & Yusuf, R. (2014). Karakteristik dan potensi pemanfaatan lahan gambut terdegradasi di Provinsi Riau. *Jurnal Sumberdaya Lahan*, *8*(1), 133271.

Nugroho, A. D., Utami, S. N. H., Yuslianti, Y., Nurrokhmah, L., Al Huda, A., Suryani, L., Riyadi, I., Ulfaizah, U., Septijono, T., & Adhini, H. A. N. (2017). Pelaksanaan program upaya khusus (UPSUS)

swasembada pangan di Kabupaten Wonosobo Provinsi Jawa Tengah. *Jurnal Pengabdian kepada Masyarakat*, *3*(1), 1-17. https://doi.org/10.22146/jpkm.27345

Page, S. E., Rieley, J. O., & Banks, C. J. (2011). Global and regional importance of the tropical peatland carbon pool. *Global change biology*, *17*(2), 798-818. https://doi.org/10.1111/j.1365-2486.2010.02279.x

Page, S., Hosciło, A., Wösten, H., Jauhiainen, J., Silvius, M., Rieley, J., Ritzema, H., Tansey, K., Graham, L., Vasander, H., & Limin, S. (2009). Restoration ecology of lowland tropical peatlands in Southeast Asia: current knowledge and future research directions. *Ecosystems*, *12*, 888-905. https://doi.org/10.1007/s10021-008-9216-2

Peraturan Pemerintah Republik Indonesia Nomor 71 Tahun 2014 Tentang Perlindungan dan Pengelolaan Ekosistem Gambut

Pohan, W. S., Syarifuddin, H., & Hamzah, H. (2023). Analisis tingkat pengetahuan dan partisipasi masyarakat dalam pencegahan dan pengendalian kebakaran lahan gambut di Taman Hutan Raya Orang Kayo Hitam (Studi kasus: Desa Seponjen dan Desa Sungai Aur, Kecamatan Kumpeh, Kabupaten Muaro Jambi, Provinsi Jambi). *Jurnal Ilmiah Universitas Batanghari Jambi*, *23*(1), 1018-1034. http://dx.doi.org/10.33087/jiubj.v23i1.3293

Purnamayani, R., Dariah, A., Syahbuddin, H., Tarigan, S. D., & Sudradjat, S. (2022). Best practices pengelolaan air perkebunan kelapa sawit di lahan gambut. *Jurnal Sumberdaya Lahan*, *16*(1), 9-21.

Purnomo, H., & Puspitaloka, D. (2020). *Pembelajaran kebakaran dan restorasi gambut berbasis masyarakat*. CIFOR.

Rachmawati, R. R., & Tarigan, H. (2019). Inovasi pertanian dan pemberdayaan masyarakat petani di lahan gambut. *Forum Penelitian Agro Ekonomi, 37*(1), 77-94. https://doi.org/10.21082/fae.v37n1.2019.77-94

Rahman, A., Wasistiono, S., Riyani, O., & Tahir, I. (2023). Peran organisasi masyarakat (Ormas) dan Lembaga Swadaya Masyarat (LSM) dalam pembangunan berkelanjutan di Indonesia. *Ekonomis: Journal of Economics and Business*, *7*(2), 1461-1471. http://dx.doi.org/10.33087/ekonomis.v7i2.1492

Sabiham, S., Tarigan, S. D., Agus, F., & Setyanto, P. (2012). Organic carbon storage and management strategies for reducing carbon emission from peatlands: A case study in oil palm plantations in West and Central Kalimantan, Indonesia. *Pedologist*, *55*(3), 426-434.

Triadi, L. B. B. (2020). Restorasi lahan rawa gambut melalui metode rewetting dan paludikultur. *Jurnal Sumber Daya Air*, *16*(2), 103-118. https://doi.org/10.32679/jsda.v16i2.677

Weningtyas, A., & Widuri, E. (2022). Pengelolaan sumber daya air berbasis kearifan lokal sebagai modal untuk pembangunan berkelanjutan. *Volksgeist: Jurnal Ilmu Hukum dan Konstitusi, 5*(1), 129-144. https://doi.org/10.24090/volksgeist.v5i1.6074

Zunaidi, A. (2024) *Metodologi pengabdian kepada masyarakat: Pendekatan praktis untuk memberdayakan komunitas*. Yayasan Putra Adi Dharma.