

The Unfinished Debate: Socio-Legal and Science Discourses on Forest Land-Use and Tenure Policy in 20th Century Indonesia^{1 2}

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Abstract

In recent years, policy research in Indonesia has questioned the mandate of the state to control and manage the forest. This question developed following several conflicts and disputes over forest land reported during the reformation period in 1998. Many authors argue that the present uncertainty in state forest management and control goes back to an unfinished debate during the Dutch Colonial Period. In Java, state forest areas today cover 24.26% of land or 3,009,779 hectares, consisting of forest production, forest protection and forest reserves. This is almost equal in size with the 3,057,200 ha of Java's land designated as state forest by the Dutch colonial administration in 1946. This ongoing application of these past designations brings us to question the arguments and justifications behind the Dutch Colonial Government's decisions. This paper explores the scientific discourse on the issue of forest land-use and its implications for land tenure policy during the colonial period and current policy framework of forest tenure.

I. Introduction

Dutch involvement in forestry affairs in Indonesia dates back to the Dutch East-Indies Company era in the 17th century, when the company started to use the valuable teak timber found in the forest here for building its fleet, fortifications and offices. Thus, the primary interest in the forests was in their produce⁵. Production forestry was indeed developed as the first conception of forest management by the Dutch East-Indies Government.

With the advent of the big agricultural estates in the upland as well as in the lowland areas due to the creation of the Agrarian Law of 1870, the need was felt to preserve forested areas in the mountains, which would serve as a land source for mountain plantation estates (for example, coffee and tea). There was also the need to protect against erosion and retain a balance of water flows, necessary for an effective irrigation system of large private sugar estates and local farmers' wet rice fields in the lowlands⁶. The protection forestry concept

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⁵ Departemen Kehutanan. 1986

⁶ J.S. van Braam. 1904.

was thus introduced. However, the state is not always neutral and cannot necessarily solve soil erosion problems as there are always winners and losers⁷.

During that period, there was a conviction that water supplies were decreasing due to deforestation. The theoretical foundation of the conviction that deforestation was explicitly linked to changing hydrological regimes was centred primarily on the notion that forests act as sponges and thus conserve local water supplies. Based on archival research, the paper argues that an exaggerated discourse on deforestation can be traced to a sustained power struggle between the Forest Service and the Interior Administration. The resistance of the Interior Administration to the Forest Service's efforts to gain greater control over forest lands led ultimately to the latter's adoption of a specific model of forest functions; one that provided a predictable and alarming account of the consequences of subsistence land use practices. In Java, through the Forestry Law 1927 and Forest Regulation 1932, the Forest Service successfully gained control over all forest land, while outside Java it struggled to do this⁸. Behind this scientific debate lay the position and manoeuvrings of the Forest Service in relation to two political positions of that time, between so called the "liberals" (those who were against Cultivation System and preferred to lease the land to foreign companies) and the "conservatives" (those who were in favour of the Cultivation System and believed that state monopolies should assure public welfare)⁹.

This paper examines the chronological progression of science discourse, as articulated in published journals between the late 19th and early to mid 20th century. Special attention is paid to the end of the era of the Cultivation System, 1870-1940, when the colonial government introduced its 'ethical policy' (*politik etik*), as a correction to their previous extractive policy, as this may be relevant to the current Reform Era in Indonesia. The chronological presentation here does not to present the details of what happened as "objective history" but rather seeks to explain how the past is represented in the minds of people today¹⁰. The paper explores the connection between a scientific paradigm of the era and authorities' use of this science to justify a particular position. The paper also examines the consequences of forest science to local people's rights over forest lands.

II. Forest Policy Developments and Science Discourse

In 1865, the first forestry law for Java was introduced, along with the *domeinverklaring*¹¹ of 1870 for lands outside Java, which declared all unclaimed land, including forest, as the

⁷ Blaike Piers. 1985.

⁸ G.J. Nolst Trenite,. 1940.

⁹ For further regarding the liberal and the conservatives, see Taro Goh 1986 and Robert van Niel.

¹⁰ Taro Goh, 1998. This approach called "ideological history".

¹¹ The *domeinverklaring* policy was derived from the Agrarian Law 1870 that declared that all land that could not be proven to be owned (individually or communally) by villagers (i.e. land that was currently under tillage or that had lain fallow for more than three years) was the property of the state. Even though the population exercised traditional rights, such as reclamation, wood cutting etc, the government did not admit existence of proprietary rights of small Indonesian communities to immeasurable expanses of unused land, apart from certain rights of reclamation and of gathering forest products. See A.D.A De Kat Angelino. 1931.

domain of the state¹². From then on, more and more forests came under government control. This policy nearly always focused on forests as these were seen as essential for hydrological reasons.

In the late 19th century, many Dutch foresters in Dutch East-Indies were greatly influenced by the belief that presence of forest is the only significant influence over water distribution (hydrological condition). Articles by de Jong in 1892 and Ham in 1909 described the role of forest in water regulation to be similar to that of a sponge. This role depends largely on the humus layer in forest soils. Humus is created by the protection afforded by the tree crowns, by the formation of leaf mould, and by the presence of living and dead roots and an abundant soil fauna. This increases water storage and absorptive capacities of soils. The water is released slowly by the humus providing regular water flow distribution over time¹³.

Several articles in 1880 until 1915 also observed the hydrological significance of the forests in several districts. Decreasing river flows during dry seasons and floods during rainy seasons were considered to be indicators of hydrological problems. Deforestation by local agriculture and the sale of land for long lease and government coffee estates were attributed as the main causes of these hydrological problems. The articles suggested reforestation and establishing forest reserve as strategic policies for maintaining hydrological functions¹⁴. However, little quantitative data was provided to support this argument and it seems likely that policy preference was in fact the driving factor. Indeed, without any further studies, in 1920 the government decided that at least one-fifth of the surface of the island of Java should remain under forest to preserve the general hydrological system.

The belief of scientists at that period regarding the critical role of forests in the hydrological situation and their recommendations of reforestation had a direct effect on the response of authorities to flood and drought¹⁵. The purchase and reforestation of agricultural land and expansion of the reserved forest were undertaken to solve hydrological problems. One article suggested reforesting 20,000 ha of private lands in West Java as forest reserves¹⁶. In 1911, outside Java, the authorities approved the creation of forest reserves and reforestation to improve hydrological conditions, which were thought to be badly affected by deforestation. In 1913, the authorities designated the first managed forest complexes, 3,300 sq km in all¹⁷. At that period, it seems that there was no alternative policy to address hydrological problems apart from reforestation and forest reserve.

In spite of the government's efforts, the current policy at that period was considered not to have significantly improved the hydrological situation. All forests in West Java above 1,570 m and those above 1,255 m in Central and East Java were eligible for inclusion in watershed

¹² After the promulgation of Forestry Law 1865, the Dutch Colonial Government measured the forest under specific types of cover and under different form of management. It split forest into three large categories: 1. teak forests under a regular system of conservancy, 2. teak forests not under a regular system of conservancy, and 3. Junglewood forests.

¹³ A. de Jong, 1892 ; S.P. Ham, 1909.

¹⁴ A.J van Schermbeek, 1880; S.P. Ham, 1894; H. Beekman, 1913; T. Altona, 1914a; T. Altona, 1914b; van der Plas. 1915.

¹⁵ Anonymous. 1922; Anonymous, 1923; Anonymous, 1924. .

¹⁶ Kerbert, H.J. 1916. ; Zwart, W. 1928. .

¹⁷ Anonymous. 1914. ; Braam, J.S. van. 1914. ; Endert, F.H. 1933.

protection forest. These altitude limits on forest reserved was not based on the principles of forestry, but on the interests of the coffee estates and the agriculture of the local people. The lower altitudinal limit of forest reserves was in fact the upper limit for viable coffee cultivation.¹⁸ There was a growing urgency from the forest officials to change this policy to improve the hydrological problems¹⁹.

Studies from other countries showed results different from the conclusions of the Dutch East-Indies scientists regarding the critical role of forest in hydrological situations. However, most reviewed articles criticized these findings and adhered to the long-held beliefs²⁰. In the late 1920s, one sceptical article did question this view. The article, published by Roessel, contained considerable quantitative data related to his research in Brantas River (East Java). Most of the previous publications on hydrological conditions in Brantas River were based on popular belief, not on scientific arguments. Thus, it is not surprising that Roessel's more rigorously researched findings differed from earlier arguments. Roessel referred to previous hydrological investigations made in Switzerland and concluded that water supply is regulated by substrata that are not influenced by vegetation. He also investigated several rivers in the young volcanic mountains of South Surabaya and concluded that there was no connection between forest vegetation and water supply in the dry seasons. Deforestation does not necessarily result in bad hydrological conditions and dense reforestation does not always guarantee good water supplies in the dry season. With regard to these dry season water supplies, he concluded that the influence of the geological formation of the soil is dominant and vegetation exerts only small influence. Instead, the case showed similarities with the work of Burgers in Switzerland showing that water supply was mainly influenced by geological formation. Thus, the paper argued, it was a mistake to always impute diminishing water supply to changes in the vegetation²¹.

There is no doubt that Roessel's theories brought a new perspective and knowledge to Indonesian forest science. However, several foresters disputed his conclusions. In 1927, Zwart argued that the theory over-emphasized the issue of forest influence on river-flows during dry season and ignored other elements such as water quality, flooding, erosion and landslides. The author also concluded that diminishing river-flows during the dry season were due to high evaporation from deforested areas. So deforestation did affect the river-flows during the dry season²². In the same year, another article by Steup also disagreed with the considerations and conclusions of Roessel. He stated that vegetation influences the hydrological state more than the geological formation²³. Similarly, Oosterling disagreed with Roessel's conclusions and supported the orthodox idea that the vegetation has a greater influence on the hydrology of any given area than does the geology. He supported expansion of forest reserves through reforestation and the necessity to collect data for determining where and how many forest reserves should be established²⁴. Several years later, in 1936, de

¹⁸ Brascamp, E.H.B. 1920.

¹⁹ Zwart, W. 1926.

²⁰ ten Oever, H. 1910. ; van Zon, P. 1912. . Wind, R. 1922.

²¹ Roessel, B. W.P. 1927.

²² Zwart, W. 1927.

²³ Steup, F.K.M. 1927.

²⁴ Oosterling, H. 1927.

Haan acknowledged Roessel's conclusion about the influence of geological formations on hydrological condition, but he disagreed with the opinion that vegetation has less influence on hydrological conditions than does geological formation²⁵.

Interestingly, Roessel's article was not the only one that questioned the benefits conferred on hydrological conditions by forests. In 1930, an article reviewed four major studies from Switzerland, USA and Japan, and suggested some doubt on the general role of forest in influencing hydrological conditions. It also suggested that further research in Java not be based on generalization, but on local conditions²⁶. In the same year, de Haan's article argued that the forests' influence on hydrological condition depended on different climatic conditions and soil properties. In his research, he concluded that vegetation has no influence on the amount of precipitation/ rainfall or on the percolation of water in deeper soil layers. However, he still regarded forests to have greater influence on hydrological conditions than the type of vegetation²⁷. Another article in 1934 by van Es also questioned the benefits of forest in karst areas. He claimed that in these locations, forest could in fact make local water availability more difficult. His study in the forests in the mountainous limestone area of southern Central Java showed that these forests lower local water tables²⁸.

Most recent studies at that time saw the significance of geological formations toward the hydrological conditions. However, the policy-makers still held the long-adhered belief on forest roles on hydrological conditions and the fact that geology modifies hydrology and infiltration was of relatively little significance to policy makers.

By the end of 1930s, the increased doubt regarding the hydrological significance of forest had not changed foresters' perceptions. In his speech at the 1938 Forest Congress in Yogyakarta, Bos stated that forests prevent soil erosion and floods and also retain water longer in wells and rivers during dry seasons. He supported the existing policy on allocating 20% of Java's land, for hydrological reasons, as forest²⁹. In 1939, another article by Heringa, an Inspector for the Forest Service in East Java, pleaded for a substantial increase of forest cover on Java for its hydrological benefits. Heringa followed the long-established theory when he stated that:

'the forest works as a sponge; it sucks up the water from the soil in the wet season, to release it gradually in the dry season at the time when there is shortage of irrigation water. A decrease of forest cover would therefore bring about decrease in discharge during the dry season and cause a shortage of irrigation water. Therefore, a balance was needed between forest condition and output of agricultural lands. Consequently, one has to determine a minimum forest percentage cover for every catchments area'³⁰.

This theory held by Heringa would later lead to policies to purchase and reforest farm land and agricultural estates when forest targets were not met.

²⁵ de Haan, J.H. 1936.

²⁶ Japing, H.W. 1930.

²⁷ de Haan, J.H. 1933.

²⁸ van Es, 1934.

²⁹ Bos, J.H. 1938.

³⁰ Heringa, P.K. 1939a.

What Heringa stated in his article stirred up a new debate. In an article published in 1938, Roessel criticized the use of hydrological arguments to justify reforestation. He proposed the infiltration theory that emphasized that percolation of water through the subsoil produces spring water. This is not directly related to forest cover. He disagreed with the ‘sponge theory’ that reforestation improves the hydrological situation. According to Roessel, reforestation may be carried out if certain soil types are susceptible to erosion when exposed, but only after other measures, such as terracing, catching holes and soil cover have proved insufficient³¹. Another article by Coster, working at the Forest Research Institute in Bogor, provided quantitative data and suggested a synthesis on these theories, ‘vegetation determines recharge to the sponge, but most water is held in the subsoil, not in the forest as such’. However, he also stated that circumstances in Java (high rainfall and steep slopes) are not the same as in Holland, thus limiting the validity of the infiltration theory promoted by Roessel³².

Heringa reacted to Roessel’s criticism. He still supported the policy of a minimum amount of forest cover in Java to be created through reforestation programs. He also stated that the reforestation policy was not only the consequences of the ‘sponge theory’, but also of the infiltration theory³³. In response, Roessel wrote an article in which he still disagreed that reforestation was the only right way to reach a balanced hydrological state. Other proposed solutions with many advantages included terracing the fields, catching the silt from run-off flow in holes and using green manure as alternative policies, beside reforestation and forest reserve³⁴.

Clearly, the objective of this discourse was not only focussed on the hydrological functions of the forests, but also on the policies on improving hydrological conditions. Until the end of 1942, the discourse continued and most foresters still insisted on the ‘forest belief’, that forest reserves and reforestation are the only solutions³⁵.

Table 1. Three Perspectives on the Relationship between Forest and Hydrological Conditions³⁶

Aspect	Forest as sponge theory (Heringa)	Infiltration theory (Roessel)	Synthesis (Coster)
Dry season river flow	Depends on forest cover	Depends on geological formation	Vegetation determines soil permeability
Required forest area for hydrological functions	A minimum required fraction can be calculated from the area of rice fields to be irrigated with dry season flow	There is no minimum forest cover	Discharge of springs depends on the amount of water that percolates into the soil minus the loss of water because of evaporation.

³¹ Roessel, B.W.P. 1938.

³² Coster, Ch. 1938.

³³ Heringa, P.K. 1939b.

³⁴ Roessel, B.W.P. 1939a. Roessel, B.W.P. 1939b.

³⁵ van Coster, C. 1941. de Haan, J.H. 1942.

³⁶ Adopted from van Noordwijk *et al.* 2004.

Table 1. Continued

What to do if forest target is not met?	Farm land of farmers and agricultural estates has to be purchased and reforested	Reforestation is only carried out if certain soil types expose susceptibility to erosion, but then after other measures, such as catching holes and soil cover have proved insufficient	Depends on elevation. Lysimeter measurements indicated that the evaporation of a free soil surface 1200, 900 and 600 mm per year at locations with an elevation of 250, 1500 and 1750 m.a.s.l., respectively.
Forests or ground cover?	All soil types are equal; reforestation with industrial wood species has the same hydrological effect as natural forest and is better than agricultural estates	An agricultural estate which succeeds to ban superficial run off by terracing etc or soil cover, is hydrologically more valuable than an industrial timber plantation, where surface run off can still take place, for example, because steep slopes, poor undergrowth or poor humus formation.	Measurements showed that well maintained tea, coffee, rubber and kina plantations are from a hydrological point of view nearly the same as forests (planted or natural) but superior to agricultural fields.
Scope of reforestation	All problems with hydrological conditions can be cured with reforestation	Recovery by reforestation can only be expected in cases where superficial run off and erosion can be controlled with good forests. Forest without undergrowth and without good humus formations are usually not sufficient. A soil cover with grass, dense herbaceous or shrubby vegetation, however, will do.	Reforestation in low lands may decrease the discharge (including that in the dry season), because of the high evaporation rate from the forest. In mountains, the increased infiltration of abundant rain into the soil more than offsets the increased water use by trees.

According to most of foresters at that time, the implication to the hydrological policy was what the local communities were doing was seen as wrong, bad for the hydrological situations, a “problem”. This implication was the consequence when the policy-makers did not fully comprehend or recognize other scientific arguments that geology formation modifies hydrology and infiltration. The following section will describe the implication of hydrological policies based on this forest belief to local communities’ land use rights. Yet the discourse about whether these perspectives are right or wrong is still disputed to this day. Several more recent studies shows have produced new data which calls into question the role of forests in hydrological cycles and new refinements of our knowledge are being developed³⁷. These issues are not being taken into account in discussions about the state’s relation to production and patterns of surplus extraction. Beside this view, Blaikie argues that it was an approach to soil conservation and not the land users themselves but of the rulers, political and economic interest towards the people of the colonized area and to the natural resources they found there.

³⁷ Hayward, B. 2005. From the Mountain to the Tap : How Land Use and Water Management Can Work for the Rural Poor. http://www.frp.uk.com/assets/Water_book.pdf; FAO and CIFOR. 2005. Forests and Floods: Drowning in Action or Thriving on Facts? http://www.cifor.cgiar.org/publications/pdf_files/Books/BCIFOR0501.pdf.

III. The Impact of Forest Reserve and Reforestation to Land Rights: Securing Forest under the State Domain

The previous section has described the ‘forest belief’ and its science discourse. These beliefs brought new policies: reforestation and forest reserves, which were justified for hydrological reasons. Interestingly, even though there were some doubts on the critical roles of forest on hydrological reason, some of the authorities still “believed” in this argument, as described by Heringa previously. This “belief” was shared by most of the Forest Service staff at that time and represented a political position towards the two political blocks of the era, the “liberals” and the “conservative”, after the implementation of the *Domeinverklaring*. This broader political debate continued up until the Japanese occupation. The liberals supported free labour and a system of Western Capitalistic private enterprise as the means to exploit the colony. Further, they supported the individual ownership of land and promoted the conversion of indigenous inheritable land possession into a right of property in the Western sense. On the other side, critics of this approach argued that not enough was known about native forms of tenure to justify the conversion of inheritable individual possession to alienable property. These conservatives used political openings to present their case at the heart of which was a debate was about whether the state had ‘domain’ over land, including forests.

Debate of State Domain and Forest Service position

At the end of the Cultivation System and in the early stages of the corrective action (*politik Etik*), in 1870-1930s, there was a big and unresolved debate about state’s domain, which had arisen as the consequence of the varied ways of implementing the *domeinverklaring*. The administrators run the state freely according to their own interpretations and interests, which were not based on law but on personal convictions³⁸. However, by 1940, it was recognized that the administrators differing perceptions were central to the implementation of the law, and were based on their own interests and probity³⁹.

Most of the debates were channelled through two schools of thought, led by their respective proponents Van Vollenhoven and Nolst Trenite. Van Vollenhoven argued that the *domeinverklaring* should recognize that *adat* (customary) rights over land and resources were distinct forms of land tenure from those in European property law and should be excluded from the state domain⁴⁰. However, Trenite argued that all lands inside the boundary of the state that are not owned privately should become state-owned land⁴¹.

Many scientists at that period were very concerned that extensive forest lands were under the state domain and that the local people did not have any legal rights over these areas. Hydrological and soil conservation arguments were used by the state to exert power in reforestation and reserve of as much of this land as possible. In 1920, a review article

³⁸ Van Niel, Robert, 1992

³⁹ Trenite, 1940

⁴⁰ Burns Peter 2004, Concept of Law in Indonesia; The Leiden Legacy Leiden Legacy. KITLV Leiden

⁴¹ Trenite 1920, Inleiding tot de Agrarische Wetgeving van het Rechtstreeks Bestuurd Gebied van Nederlandsch_indie. Weltevreden, Landsdrukkerij, p4

described now, after the *domeinverklaring* statement, local people had to pay for the wood products from forests that had previously been their own property⁴².

In 1929, Japing asserted that land conflicts had increased since so many forests were designated as state forest land. Riots occurred in West Sumatra as the Forest Service collected levies on all wood cut from forests by local people. Previously, the local people had been free to cut and collect the wood for their daily use⁴³.

Similarly, Koesoema Oetoyo, a People's Council delegate, saw a significant issue of conflict between the Javanese traditional practice of foraging, gleaning and grazing livestock in the forest and the state's commitment to the preservation of virgin forests. According to him, the conflict took place because the government denied the local peoples 'right of disposal'⁴⁴ (*beschikkingrecht*) of land⁴⁵.

Based on these considerations, in 1928, the colonial government decided to appoint an Agrarian Commission to advise on the abolition of domain lands based on the *domeinverklaring* as the basis for land tenure of the agrarian legislation and to briefly outline changes to the legislation and the practical application of the legislation⁴⁶. In its report, the Agrarian Commission concluded that the *domeinverklaring* policy should be abolished as this policy had threatened the 'rights of disposal' of the local people. The commission forwarded a note explaining how recognition of the 'right of disposal' of local people related to all existing laws and regulations. It also advised the replacement of all laws and administration regulations, which hampered the recognition of the 'rights of disposal' of local people⁴⁷. This advice meant that the Forest Ordinance of 1927 for Java and Madura should be replaced, as it was considered to oppose the 'right of disposal' of local people. In contrast, for islands other than Java and Madura, there was no forest law forming the basis of forest policy.

⁴² Brascamp, E.H.B. 1920.

⁴³ Japing, C.H. 1929.

⁴⁴ ⁴⁴ The term of *beschikkingrecht* is explained in ter Haar, B. 1939 and is interpreted as a 'right of disposal' by van den Bosch, A. 1944. The term suggests that the local people have the rights the entitlement to allocate land to community members. The right of disposal, according van Vollenhoven, has six characteristics 1) the community itself and its member may freely use the wild lands situated within the area of its jurisdiction, reclaim them, found a hamlet, collect produce, hunt and graze; 2) strangers may do this only with the consent of the community; 3) members sometimes and strangers always must pay something in recognition of the use of the land; 4) the community is responsible for certain definite misdemeanors committed within the area, the perpetrator of which cannot be detected; 5) the community cannot permanently alienate its supreme right of disposal; 6) it preserves the right to interfere even with reclaimed soil within the area of supreme disposal (point six is not very clear).

⁴⁵ Agrarische Commissie. 1930.

⁴⁶ Other concern that led to appointment of Agrarian Commission was the opinion of the Leiden School that the *domeinverklaring* principle had its root in the abuse of power by the former native kings, and therefore not acceptable in a modern state. See van Vollenhoven, C. 1932. He and Prof. Logemann and Ter Haar of the East Indies Law School questioned the wild lands which have been given out in concessions actually belong to the free public domain, or whether there does not rest upon much of these lands an Indonesian private property protected by the agrarian legislation of 1854, 1870 and 1874. They contend that the only solution to the problem is recognition of the fact of the right of disposal by the native community and a restriction of that right wherever and to whatever degree the general interests' demands it. See van den Bosch, A. 1944.

⁴⁷ Agrarische Commissie. 1930.

The Agrarian Commission's advice became a major subject of debate at the 1932 Congress of the Association of Senior Officials of the Forest Service in Dutch East-Indies⁴⁸. The forest officials rejected the Agrarian Commission's advice and used hydrological reasons to support their argument. Gonggrijp remarked that the purpose of the Forest Service's forest management was to improve the hydrological condition of the forests. This purpose could only be achieved if all unclaimed and uncertain land, including forests, were the domain of the state. According to him, the idea of recognizing the 'rights of disposal' of local people would reduce the Forest Service's ability to protect hydrological conditions. He also feared that the local communities could not manage the forest for hydrological purposes⁴⁹. He gave as historical examples, European and American forest policies, which, by placing forests under the management of the government (domain policy), had protected hydrological and orological conditions⁵⁰. He pleaded for the government not to abolish the *domeinverklaring* policy, as this policy gave the Forest Service opportunities for good management in Dutch East-Indies. The preservation and productivity of the soil was at stake if the *domeinverklaring* policy were abolished⁵¹.

Another argument, advanced by Heringa, stressed the importance of land and forest management rather than the legal aspects. Because of deforestation, the river flows had decreased and the soil fertility had been reduced. Reforestation and forest reservation efforts were important to restore hydrological and orological functions. He recommended that the solution to support these efforts was to make forests state domain. Only then could the state manage the land in the public interest and maintain hydrological and orological functions. This imperative overruled all private rights and any 'rights of disposal' of the local communities⁵².

Logemann, who was a member of Agrarian Commission, defended the advice of the commission. He asserted that the 'right of disposal' of land could not be abolished suddenly without endangering the livelihood of the communities and without disturbing the political equilibrium with the local people. He also stated that the government could not expect cooperation from the local people with reforestation and forest reservation if their rights were ignored⁵³.

However, other articles published in 1930 and 1937 also objected to the abolition of the domain principle (*domeinverklaring*). They highlighted the importance of forest protection and security by the Forest Service in securing the forests' hydrological functions. They also mentioned that recognition of the 'right of disposal' of the villages would mean that important national interests such as forest for climate and hydrology, would be turned over to the villages, which were unequipped to deal with these interests⁵⁴.

⁴⁸ Many articles had been published as a respond to the Agrarian Commission advice. However, those responses were stressed on legal aspect, not on environmental significances from the forest. See de Stoppelaar, J.W. 1931. and Kielstra, J.C. 1932.

⁴⁹ Gonggrijp, J.W. 1932a.

⁵⁰ Gonggrijp, J.W. 1932b.

⁵¹ Gonggrijp, J.W. 1932c.

⁵² Heringa, P.K. 1932.

⁵³ Logemann, J.H.A. 1932.

⁵⁴ Deelman, A.G. 1930. Anonymous. 1937.

As described before, the forest myth had been used as a justification to position the Forestry Service within the liberal camp, that forest land should be expropriated from the possession of the owners. To ensure that the interests of the next generation be protected, the *Domeinverklaring* should be maintained.

Establishing Forest Protection and Security under the State Domain

When forest was thought to have a significant role in regulating hydrology, naturally, it was also considered important to protect and secure this forest from the harmful effects of any human activities. In an 1895 article, Ham stated that shifting cultivation and forest fire were hindrances to the development of forest reserves needed for securing climate and hydrology. He urged the government to stop shifting cultivation by making this activity illegal and by intensifying production by local people of the remaining agricultural⁵⁵. In 1909, van Eck also argued the importance of protecting forests that served public interests, such as hydrology and climate functions, from cattle grazing and shifting cultivation⁵⁶. Both of them felt that it was urgent that forests were put into the state domain and under state management for better protection. Another article by Oosterling suggested severe punishment of these activities inside the forest reserves to achieve hydrological functions of the forests⁵⁷. However, none of those articles provided scientific evidence of the harmful effects of these activities on hydrological functions of the forests.

Several articles, summarised below, did try to explain these assertions through scientific arguments. A 1909 article by Ham surveyed the methods of cattle grazing and grass cutting by the local people in the forests of Java. The survey found that these activities had caused severe erosion and increased run-off. They also destroyed the humus layer and thus, decreased the absorptive capacity of forest soils. The article concluded that cattle grazing and cutting grasses for fodder must be prohibited inside forest reserves⁵⁸. Ham's conclusion on harmful effects of cattle grazing on forest soils were consistent with those of Deventer, who in 1916 had stated that forest soils might well be protected when cattle were not permitted to graze in the forest⁵⁹.

Another interesting fact is that all articles above not only claimed there were scientific reasons for keeping forests in the state domain, but also asserted the necessity that the Forest Service, not the Residents, should be given the responsibilities to manage and protect these forest functions. Their suggestions were related to the fact that, at that period, most of the forest lands were not even fully controlled by the Forest Service, but came under the authority of the Resident instead⁶⁰.

⁵⁵ Ham, S.P. 1895.

⁵⁶ Van Eck, R. 1909.

⁵⁷ Oosterling, H. 1927.

⁵⁸ Ham, S.P. 1909.

⁵⁹ van Deventer, A.J. 1916.

⁶⁰ Bellers, H. 1924.

Other scientists concentrated their research on the harmful effects of shifting cultivation on hydrological conditions. Shifting cultivation had decreased the local soil fertility, left covered with only grasses, ferns and shrubs, and destroyed humus and hydrological conditions. They suggested it was necessary to invoke the *domeinverklaring* policy against disposal rights (*beschikkingrecht*) of local people. Communities governed by custom (*adat*) did not prescribe a proper regime to manage and maintain soil, but only asserted the rights of individuals to claim land. *Adat* also prescribed the period that the land may be exploited, after which the land is taken back by the “*marga*” (*adat* community). The government must not leave the maintenance of soil and soil productivity to *adat* communities. It was also suggested that barren areas in mountainous regions, which had been previously cleared for shifting cultivation, must be reforested, even if this was at the cost of the local people, including the cultivators themselves⁶¹.

Resistance by the Residents to these arguments has also been recorded from that period. For example, the Resident of Palembang suspected that the harmful influence of shifting cultivation on the hydrological functions of forests was exaggerated. He noted that the local people had their own forest reserves for hydrological functions, and observed that shifting cultivations did not destroy the forest⁶². He also urged that, if the reservation of forests was to be imposed for the local people’s interest, then these forests should not be granted to European farmers or those interested in timber extraction⁶³. He also resisted the using of *domeinverklaring* policy against the disposal rights of local people⁶⁴.

The Banten Resident tried to legalize the shifting cultivation inside the designated forests by decree. However, the Huma Commission, set up by the government to resolve land disputes and solve hydrological problems, concluded that shifting cultivation was having a harmful effect on the water discharge of the Ciujung River and it urged the government to resettle the local people from the forests. In the end, the government followed the commission’s recommendation⁶⁵.

IV. Towards the Current Situation: Discussion and Conclusion

A key objective of this paper has been to explore the progression of ideas during the late 19 and mid 20th centuries, regarding the hydrological and protective capabilities of forest. The conflict between the Forest Service and other departments such as the Interior Administration, over issues of forest land control resulted in certain foresters greatly exaggerating the protective value of forests. At various points in time, officials of the Forest Service indicated that forests could control floods, maximize river-flow throughout the year and prevent the loss of valuable soils. Based on these claims, the Forest Service advanced reforestation and forest reservation as solutions to hydrological problems. Many scientists used their empirical research to question the theoretical underpinnings to each of these claims, but in turn, their criticism was rejected by most Forest Service officials.

⁶¹ Thorenaar, A. 1921. Bongers. 1925. Hansen, J. 1925.

⁶² van Setten, D.J.G. 1922.

⁶³ van Setten, D.J.G. 1923.

⁶⁴ van Setten, D.J.G. 1925.

⁶⁵ Hoemacommissie Bantam, 1932. Kools, J.F. 1935.

In order to influence policy, the Dutch foresters were highly selective in their use of evidence to advance their arguments. For example, foresters often used the most glaring examples of changed river-flows to substantiate their arguments regarding the damaging effects of the removal of forest. An assumption was made that forest cover over these areas must have been extensive in former times and that their current barren state was entirely due to the removal of forest. In all of this, foresters were simplifying the complexity of ecological interactions, thereby enabling a fit between their own theories and an observable phenomenon. Other foresters used soil preservation as their arguments against all human activities inside the forest. The suggestion that all human land use and activities led to deforestation and that deforestation caused bad physical conditions was the major argument used by the Forest Service to exert greater power over forest land.

Through the enactment of the Forestry Law 1927, the Forest Service in Java had successfully gained control over all forest land. It had the power to designate forest as state land and to subject other human land uses to this reservation⁶⁶. Through the 1920s and 1930s, the Forest Service continued buying up critical land, that is, land with poor hydrological conditions. In some areas these efforts led to severe problems such as resistance from local communities and welfare problems⁶⁷.

Outside Java, the focus of forest policy was merely to take practical measures in areas where supposed hydrological forests were exposed to the hazards of uncontrolled shifting cultivation. However, the Forest Service was still struggling to exert control over these forest lands. The activities of Forest Service, including reforestation and establishing forest reserves, were based on the principle of domain lands (*domeinerklaring*), which was in practice not upheld by the Interior Administration. The latter preferred to base its activities on the right of disposal (*beschikkingrecht*) of local people.

This paper is not only intended to question the science of forest's effects on hydrological conditions and its implication to hydrological policy, but argues that science became an instrument of the Forest Service during the Dutch colonial era. It was used to exert greater power and control over the forest, even at the cost of local people's rights. When other scientific results and solutions differed from the foresters' beliefs, the foresters would simply ignore these and still follow their old arguments. The most damaging impact of forest becoming state domain under the management of Forest Service was that local people lost their rights over forest land. The foresters had argued that for hydrological reasons, local communities should not manage forests due to their lack of abilities. Shifting cultivation and cattle grazing by the local people were alleged to be examples of bad management of the forest by local people.

After independence and until the mid 1950s, Dutch foresters continued to exert their influence over the new state authorities⁶⁸. Versteegh's note urged the Forestry Chief of Indonesia to protect the forest for hydrological reasons and not to recognize the disposal

⁶⁶ Fluyt, P.C.M. 1941.

⁶⁷ Anonymous. 1923. Anonymous. 1925. Dhanoebroto. 1934.

⁶⁸ For this legal development Wignyosubroto use the term *From Colonial Law to Nationalized Colonial Law*. See Wignyosubroto 1992, *Dari Hukum Kolonial Ke Hukum Nasional*; *Dinamika Sosial Politik dalam Perkembangan Hukum di Indonesia*. Rajawali Press ,Jakarta.

rights since these rights could reduce the Forest Service's efforts to protect forest⁶⁹. Through the Basic Forestry Law of 1967 and the Basic Forestry Law of 1999, the Government of Indonesia has maintained the Dutch colonial policies and even expanded upon colonial regulations concerning forests, as these provided a readily available basis for the expansion or consolidation of state control over land and its resources, even though the *domeinverklaring* was abolished in 1945, and as explicitly stated in the Basic Agrarian Law of 1960⁷⁰. The reservation of state forest areas and the exclusion of people from these areas are the legacy of this colonial policy. Nearly 140 million hectares of land or 70% of total land in Indonesia have now been designated as state forest areas without proper land acquisition process.

Since the fall of Soeharto, disputes over state forest areas have become a major issue.. Despite nassive symptoms of mismanagement, such as forest fires, illegal logging, floods, forest conflicts and poverty, these have not yet been enough to shift the current Forest Department from maintaining its power in controlling the land, nor to address the fundamental issue raised by the unconcluded debate about tenure insecurity in forest areas. The symptoms addressed, by scientific technical "panacea", has not worked⁷¹. No wonder poverty and forest disputes still exist until today.

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⁶⁹ Versteegh, F. 1955. Nota van Ir. F. Versteegh aan Kepala Kehutanan. Onderwerp: Ontbossing en toenemend bandjirgevaar. Unpublished: pp. 5.

⁷⁰The Advice of the Agrarian Commission (1930) are in line with the Basic Agrarian Law 1960, that rejects the *Domein Theorie*.

⁷¹ Forest eviction, forest rehabilitation, and expansion of conservation areas.

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