

WHAT IS PROBLEM REPRESENTED TO BE: WATER SCARCITY, WATER MISMANAGEMENT OR MISDIRECTING THE SYSTEMS? THE WICKED PROBLEM OF WATER MANAGEMENT IN NAULI CITY¹ – INDONESIA

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ABSTRACT

The paper delves into the area of concern of water scarcity in an area in Indonesia that we will call Nauli. The central and regional governments have misused the water provision function to commodify drinking water, and the government regards water as a commercial good and prefers to sell it to the people rather than provide it as a common good. The paper applies a critical analysis to address the social, cultural, political, economic and environmental context of the problem which reveals that the root of the problem is a misdirected system of managing water in the interests of profit for some at the expense of the majority and the environment. Data collected from a fieldwork shows that conflicts between governments occurred and water companies commodified water while neglecting to maintain water quality and to provide services that also support and preserve the environment. This paper will examine the wicked problem of how to address the challenges of decentralization by ensuring that the needs of people are met by those who are elected and that the constitutional requirements of providing water are indeed addressed. The WPRB approach is used to produce a map of the different ways in which the problem is represented, and propose a shift in the paradigm to address the water management problem through Ulrich's Critical Systems Heuristics (CSH).

Keywords: Wicked problem, water management, Critical Systems Heuristics, sustainability

Introduction

Indonesia has declared in its Constitution that '*The land, the waters and the natural resources within shall be under the powers of the State and shall be used to the greatest benefit of the people.*' This means that the government takes full control of water resources, and is responsible for distributing it to all people. Water provision functions have been transferred from central government to local government following the implementation of decentralisation in 1999. Since then confusion and conflicts have occurred between central, provincial, and local government in terms of which departments and levels of government will take responsibility for water management. Nauli City has been selected as a case study. It is the capital city of the Samsir province which is the driest province in Indonesia. The performance of water management in Nauli City was unsatisfactory compared to the national target in Indonesia and in terms of United Nation's Sustainable Development Goals (SDGs). This paper is part of a PhD undertaken by Simbolon and supervised by McIntyre-Mills in the School of Social and Policy Studies, entitled : '*Water as a public good: A critical review of Water Governance in Nauli City*'. The twofold aim of this paper (which draws on this research) is to unravel the causes of poor water provision in Nauli City and to propose an alternative approach to addressing the water management problem. Arguments presented in this paper will be supported by evidence such as documents, photographs and interviews that

¹ A pseudonym

were collected during my field visit to Nauli City and on-going correspondences following the fieldwork.

Nauli City water management problem is a wicked problem because it is perceived differently by stakeholders within different sectors that have conflicting issues and interests. As such the problem needs to be addressed holistically (Australian Public Service Commission 2007; Churchman 1979; McIntyre 2002). Analysing the wicked problem will be conducted firstly by applying Critical Systems Heuristics (CSH) to explore the existing issue and then to make policy and governance suggestions based on considering : *what is the case* and *what ought to be the case*, and then considering the issue in terms of problem structuring, and policy design recommendations.

Following this introduction, the paper will be presented in five parts. The first part will explain some of the background of a decentralised water management system that is currently implemented in Indonesia. The second part will describe the climate and geographic conditions and this is followed by an explanation about the establishment of Nauli City government, a discussion on conflict in water management and the commodification of water. The third part is about key conceptual lenses through which the area of concern is analysed whilst the fourth part explains the methodology. The fifth part analyses the problems by using Critical Systems Thinking and followed by conclusion.

Decentralised Water Management in Indonesia

The land, the waters and the natural resources within shall be under the powers of the State and shall be used to the greatest benefit of the people (Indonesia Constitution article 33). It firmly stresses that the government ought to take full responsibility in managing water as a basic need of its citizens, as people are the real wealth of the nation (UNDP 2010). The government can use the power to make regulations to control public utilities and intervening the market (Wilson 1980), and public services systems will depend heavily on the policy of the ruling regime (Gormley Jr 1983).

Water management has been considered as a local content and has been included in the local government's functions and responsibilities. This aligns with the Dublin Statement on Water and Sustainable Development that states '*that decisions of water development are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects*' (Gorre-Dale 1992).

Theoretically, Indonesia has been adopting a decentralised government system since its independence era in 1945. However it was not fully implemented until year 1999. During the first regime, the Old Order regime with Sukarno as the president (1945 to 1966), had introduced regional government through Law No. 1/1945 about the Regional-National Committee and were revised by several laws. However during this period of time, the government were still busy to establish government system and also tried to protect the independence from separatists and rebellions. Hence centralistic policies were often issued to keep the nation united (Sekretariat Negara Indonesia 1986).

Then it came to Suharto regime with his New Order regime (1967 – 1998), the term 'decentralisation' was formally used through the establishment of Law No. 5/1974. However the centralistic approach was very strong in terms of this law, and it only supports 'limited decentralisation while preserving the unitary system' (Purwanto 2005; Sulistiyanto & Erb 2005). Central government supported by military power was very strong, and all sectors of development were fully controlled by central government, and local government was required to comply with the central's plans and regulations (Sulistiyanto & Erb 2005). During this era, water management entered a new phase where the department units in charge of water management in all local government, were separated and changed into a company: a local

government owned company (PDAM)². Huge amounts of funding from foreign loans or aids was poured to support investment in water sector, and all of a sudden, PDAMs were growing very rapidly all over Indonesia along with the growing number of local governments (districts and cities). As of June 2016, Indonesia has 524 local governments, 394 of them have their own PDAM and it is still counting.

Nauli City profile

Geography and Climate

As a whole, Indonesia has abundant water. However Nauli City region is considered as the driest area in Indonesia. The City of Nauli is the capital city of Samsor Province which is located in the eastern part of Indonesia. This province has a very different climate from those of Western and upper parts of Indonesia as it has proximity to Australia (Schmidt & Ferguson 1951). The Statistics Body of Nauli City revealed that geologically, the City of Nauli landscape is very arid, rocky, mountainous and of non-volcanic matters (BPS Nauli City 2016). The below picture shows house fences made from rock, and it is very common for houses in rural area of Nauli City.



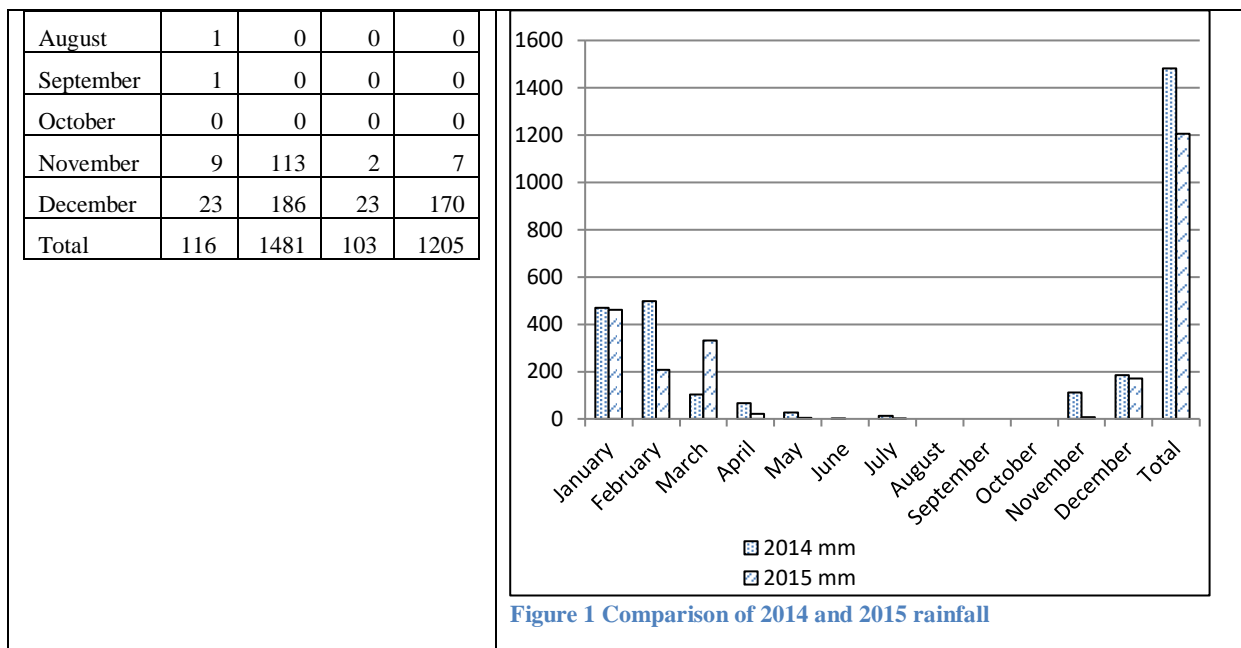
Picture 1 House fence made from rock

This region has uncertain climate and the dry season is much longer than the rainy season. The table and chart below present the comparison between the total of days of rain and the volume of rain (mm) in 2015:

Table 1 Comparison of 2014 and 2015 rainfall

	2014		2015	
	days	mm	days	mm
January	25	470	26	460
February	21	498	24	208
March	14	103	14	332
April	11	67	8	20
May	5	27	4	5
June	3	3	0	0
July	3	14	2	3

² PDAM stands for *Perusahaan Daerah Air Minum*, or Local Drinking Water Company.



The table shows that Nauli City had much less rain in 2015 compared to that of 2014. The number of rainy days in 2015 was 103. This is a decrease of 13 days from 2014, while the volume of rain that has fallen, namely 276 mm decreased from 2014. Schmidt and Ferguson (1951) classified Indonesia climate into two categories, based on their intensity of rain: wet months and dry months. A month is considered as dry if the rainfall is below 60 mm because it will not be sufficient to support evaporation, while if it is over 60 mm then it is a wet month. And based on that parameter, in 2015 Nauli City had 4 wet months and 8 (very) dry months.

The Statistics Body (BPS) of Nauli City revealed that in 2015, 50% of households in Nauli City have had private water facilities like water taps, bore wells, and rain water harvesting which 47.44% of households have to share. Just over 2 % of households get water from public sources like springs, rivers, but unfortunately 0, 48% of households without access to any water facilities. The population of Nauli City has reached 390,877 people in 2015, and the 0, 48% means there were 1,876 people that had struggled only to find water.

Conflict in Water Management

Since the independence of Indonesia, the Nauli region has been a district, namely the District of Nauli that was established in 1958 with 5,658 km² divided into several subdistricts with the subdistrict of Nauli as its capital city. Water management in the District of Nauli was performed by a PDAM owned by the district government, namely the PDAM of Nauli District, established in 1986. The service delivery is mainly for Nauli and 99% of its customers are in the Nauli subdistrict.

The subdistrict of Nauli was set up as the capital city of the Provincial Government of Samsir and promoted to an administrative city in 1978. As it grew into an urban area, it was then upgraded into an autonomous city or a local government namely the City of Nauli in

1996. Nevertheless water management in Nauli City was still carried out by the district PDAM until 2005 when the City government decided to set up its own PDAM. The City government urged the District government to transfer all of the District PDAM's assets that are located and implanted in the city region to the City PDAM. This request was rejected by the district government, and had spurred more intense conflicts between the two governments. The City government brought this case to the provincial government, but the condition became worse.

Provincial government is supported by and acting as the representative of central government (since Law No. 32/2004 concerning Regional Government). In order to address the water crisis in this area, central governments have been building a number of huge dams that will be utilised as water sources for domestic uses, agriculture, and industries, other purposes. These dams are operated by the provincial government, and the provincial government set up a special purpose unit namely BLUD SPAM³ as the operator, and bulk water from the dams is priced if it is used for commercial purposes. Hence, BLUD SPAM operates as a company and its customers mainly are the City and District PDAMs. BLUD SPAM is not designed to sell water to end users (based on interview with Ministry of Public Works official, interviewed on 3rd December 2015). However since about 2014, BLUD SPAM started to connect its pipes directly to retail customers or end users in Nauli City like the airport, university, and some groups of residents. This situation has made water conflict in Nauli City became more entangled since there are three companies (that belong to three regional governments) that serve piped water to the people: the City PDAM, the District PDAM, and Provincial BLUD SPAM. This conflict has escalated not only between companies, but between the City, District, and Provincial governments.

Key Concepts

A Wicked Problem

A complex issue comprises many interrelated variables that can be perceived differently by different stakeholders. This kind of problems is regarded as 'a wicked problem' (Churchman 1967; McIntyre-Mills 2017; Rittel & Webber 1973). The concept of 'wicked problem' was firstly introduced by Charles W. Churchman in 1967, and he characterised it as ill-formulated. Churchman described that a wicked problem has confusing information and conflicting values, involves many decision makers and clients, and any proposed solutions can be worse than the symptoms (Churchman 1967). A wicked problem is often highly resistant to resolution (Australian Public Service Commission 2007). Some may see an issue as a problem and others may see it as a solution, or vice versa, one's solution can be a problem to another. Though water scarcity in Nauli is a problem for many, the water management systems ensures that some private and government sectors profit at their expense while ignoring the constitution that requires managing water should ensure that the rights of the people are protected.

According to Head (2010), some *complex technical* problems are not necessarily regarded as wicked problems. Some major projects challenges such as the uncertainties and

³ BLUD SPAM stands for *Badan Layanan Umum Daerah Sistem Penyediaan Air Minum* or Local Service Unit for Drinking Water Provision System.

complexities in an infrastructure project sometimes only need to be solved by technical experts (engineers, finance managers, and other planners) and funders. However when the issues in the projects escalate into other important dimensions (social, economic and environmental) and involving value disagreement and affected various level of stakeholders, then it can be regarded as a wicked problem. Rittel and Webber (1973) in 'Dilemmas in a General Theory of Planning', explain that social problems have never been tame or benign ones. They put social problems as 'wicked' because of their complexity, vicious circle, so they are 'tricky' like a leprechaun and aggressive like a lion (p. 160). Russell Ackoff use another term to explain this kind of situation: a mess (Ackoff 1974). According to Ackoff, messes are different from difficulties because messes have *many interlocking aspects* and cannot be solved, while a difficulty is a simple problem is only a small part of a mess. We know the answer for a difficulty but for a mess or wicked problem it is ambiguous: hard to pin down, hard to know what the actual source of problem is, there are multiple trajectories, usually it does not make sense to find an answer (Reynolds & Holwell 2010). If we can scrutinize the wicked problem into small parts of difficulties, then a wicked problem is bigger than the sum of those difficulties (adapted from Aristotle's: a whole is bigger than the sum of its parts). In terms of public policy area, what decision makers deal with, is a wicked problem or a mess, not a difficulty. The way in which Rittel and Weber (1973) describe the characteristics of wicked problem will be critiqued, but their definition will be shared as a starting point as follows:

1. There is no definitive formulation of a wicked problem.
2. Wicked problems have no 'stopping rule'.
3. Solutions to wicked problems are not true or false, but good or bad [and the perceptions of whether it is good or bad will vary across the stakeholders.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every (attempted) solution to a wicked problem is a 'one shot operation'.
6. We cannot identify whether the solutions to a wicked problem are complete enough.
7. Every wicked problem is essentially unique [but some processes can be better than others for addressing complex problems that are perceived differently by different stakeholders.
8. Every wicked problem can be considered to be a symptom of another problem.
9. The causal explanation of a wicked problem can be in many different ways.
10. The planner has no 'right to be wrong' in an experimental sense, i.e. there is no public tolerance of initiatives or experiments that fail.

The fact that problems of water management in Nauli City have multiple interconnected variables (which means the problems comprise many interrelated variables that are interconnected: social, economic, and environment; perceived differently by different stakeholders, and that addressing one aspect may affect or be affected by other aspects), has made this kind of problems can be regarded as 'a wicked problem' (Churchman 1967; McIntyre-Mills et al 2014; Rittel & Webber 1973). The problems will be perceived from three main points of view: social, economic and environment, as the pillars of sustainability (OECD 2003).

Sustainability as the main objective

Sustainability is the capacity to respond to the basic needs of everyone. (Gunter Pauli - The Blue Economy⁴).

The Blue Economy, a term coined by Gunter Pauli in 2010 (Pauli 2010), strives to improve the Green Economy concept in many ways. According to Pauli 2010, in order to

⁴ A talk in Tedx-Flanders At Zoo, Antwerp, 5 September 2010, published on Youtube, retrieved 25 October 2016, URL: <https://www.youtube.com/watch?v=sLh-U99avso>.

address the waste and pollution, the Green Economy approach requires huge spending for investment and subsidies which are raised from tax.

This paper addresses the issue of addressing the different ways in which problems are represented by adding insights from the human capabilities approach and critical thinking approach to stress the importance of maintaining quality of life by protecting multiple species and the environment on which they depend.

Furthermore, producing environmental friendly products is often costly and usually needs environmental friendly materials which can damage the environment itself. For instance, bio-soaps use palm oil that destroys rain forests. Pauli acknowledges that the destruction of the habitat of primates alerted him to the issues associated with the misuse of the sustainable living approach.

It is necessary to protect both people and the planet, but currently the so-called 'green or blue' traditional economies do not necessarily achieve the balance of individual and collective interests which is critical for living sustainably and well (McIntyre-Mills, 2017). Fishing areas in rivers and oceans can be protected, for example without protecting the rights of fisher folk. Land and Waters can be labelled blue or green economies but in fact be used to support economics rather than balancing individual and collective needs.

Organic foods can be sent long distances around the world which can cause pollution. The Blue Economy as defined in terms of Pauli (2010) on which McIntyre-Mills (2017) draws in Planetary Passport encourages not only creativity to improve efficiency and effectiveness, but also the emphasis on social and environmental justice in creating jobs in a so-called cascade economy that wastes nothing and no one.

Assemblages of meaning, emotion and connection are created when people are able to own a problem. The more they are able to think about their thinking the more they will be able to reflect on their own emotions and to assess the extent to which they shape the way in which they see an area of concern and work through the way in which it affects the many aspects of their lives. The right to own a problem is the starting point for a respectful dialogue about consumption choices.

This means producing, while respectfully reusing, recycle, and reconfiguring ways to use waste. For example from a cup of coffee, only 0.2% of the coffee is used. The rest of 99.8% is waste that can be used to grow mushrooms and feed the animals. The animals make manure which bacteria can produce biogas for energy, so on and so forth. With Blue Economy, the coffee waste can be utilised to produce food, energy, and jobs. The Blue Economy concept demonstrates efforts and stimulates creativity to convert scarcity into abundance (Pauli 2010, p. 14). Nauli City is known as a water scarce area, but still has precipitation that mostly turns into runoffs, and creativities are needed to catch the rain water to be utilised during the dry season.

Many seminal thinkers have supported the Blue Economy concept in many different ways. Kenneth Boulding in his book *The Economics of the Spaceship Earth* describes that there are two types of human behaviour towards economy (Boulding 1966). First, the open economy which consists of 'cowboys', that consider this earth has unlimited resources. This worldview considers that there are two big reservoirs in this world: the reservoir of input or resources, and the reservoir of output or pollution. People regard the success of an economic performance by measuring the level of production (the use of factors of production that are raw materials exploited from the nature) and the level of output or consumption or profit. In an open economy, the reservoirs which the materials are taken from and the effluents can be thrown into, are unlimited. The ultimate figure that people care about is the gross national

product (GNP)⁵, and it means the more consumption or the more production, the higher the GNP. The second sphere that is in contrast to the open economy is the ‘spaceman economy’ that regards this earth as a ‘spaceship’. In terms of this perspective ‘spaceship earth’ has limited resources and people have to reuse and reproduce everything in terms of input (resources) and output (waste and pollution). Economic performance, according to this perspective will be determined significantly by the capabilities to maintain a cyclical ecological system. Stiglitz, Sen & Fitoussi suggest that the time has come to shift the performance measuring system from measuring economic performance to measuring people’s wellbeing (Stiglitz, Sen & Fitoussi 2010, p. 10). Moreover, prices or the valuation of goods and services paid for by individuals may not contain or reflect the full underlying value that the whole society has to pay. This occurs when the costs to people, the environment and future generations of life are not factored into the cost of production. These externality and opportunity costs need to be factored into all policy decisions. Damage to people, communities and to the environment is a well-known example of the cost of production in many industries. The people who are not in the state of wellbeing will suffer most.

The Capability approach (CA) has been used in developing welfare economics and public policy by earlier philosophers like Aristotle, Adam Smith, and Karl Marx (Nussbaum 1988, Sen 1993). In present time, two renowned authors, Amartya Sen and Martha Nussbaum, have developed the CA to identify and investigate what capabilities and freedoms are and how they will be achieved. According to Sen and Nussbaum, well-being is about one’s capabilities to functioning, which include to work, to involve and get involved, to be health, to be respected, and so on. While the ultimate capabilities or freedom is when people can choose what to do, what to be, and what way/kind of living (Nussbaum & Sen 1993). However the CA has been developed in somewhat different directions by Sen and Nussbaum. Nussbaum proposed ten central human capabilities⁶ that the government should be responsible to provide and should be included in the constitution, while Sen argues that the people that are affected by the policies should decide what sort of capabilities they will choose and putting rather than putting a list (Robeyns 2003). Nussbaum (2003) assures that this list is the ‘... *minimum account of social justice*’ and should be guaranteed at appropriate threshold level.

Robert Chambers suggests as *putting the last first*, which means reversal, or making policies starting from listening to the poor, or to the very bottom of the society (Chambers 1997, p. 201), as a way to make those who are to be at the receiving end of a policy core or the central of the design process. This emphasis of participation has been stressed in the Paris agenda to which Indonesia is a signatory. Government staffs’ in rural area often distance themselves from the rural people with their style and arrogance, which prevent them doing the learning from below. Chambers stressed that learning must start from the other end, and that marginal people should release their voice so the government can make policies based on *real* reality, rather than constructed reality that often well-designed but flawed. Statistics is easier to obtain nowadays, and plenty of concepts have been used to explain the phenomena. However misinterpretation can affect decisions, and flawed decisions will distort policies. These flawed policies will not only affect current generation but also future generations in the long term. How well we deliver all resources to the future generations will determine their well-being. These resources can be in many different kinds: physical capitals like machines and buildings, soft competencies like education, research and technologies, and more

⁵ Gross National Product is the sum of a nation’s economic activity, by valuing the total of finished goods and services produced in a country by its citizens in a year (Atkinson & Stiglitz 2015; Bernanke 2014; Marshall 2009; Rittenberg 2009).

⁶ Life; Bodily Health; Bodily integrity; Senses, imagination and thought; Emotions; Practical reason; Affiliation; Other species; Play; Control over one’s environment.

importantly exhaustible and inexhaustible natural resources as well as well-conserved environment (Stiglitz, Sen & Fitoussi 2010, p. 98).

Any business should achieve success through creating values for its owners, suppliers, customers, employees, financiers (shareholders and banks) and the communities⁷ (Freeman 1984).

Aside from these values, wellbeing should be able to build stocks for the future generation. Stiglitz et al (2011, p.15, as cited in McIntyre-Mills et al 2014) proposes that wellbeing can be measured through: 1. Material living standards (income, consumption and wealth), 2. Health, 3. Education, 4. Personal activities including work, 5. Political voice and governance, 6. Social connections and relationships, 7. Environment (present and future conditions), 8. Insecurity, of an economy as well as a physical nature. The next step in the argument is that the root cause of consumption is power without responsibility—so whoever comes to power needs to be held to account through mechanisms to address social, economic and environmental indicators that secure the ‘wellbeing stocks’ for the future.’ (McIntyre-Mills (2014, 2017).

This argument draws on the concept of Triple Bottom Line (TBL) accounting developed by John Elkington in his publication *Cannibal with Forks* (Elkington 1999). TBL stresses that a business entity’s main responsibility is to the stakeholders rather than its shareholders, and its reporting should be made of three dimensions of performance: financial (cost, revenue and financial growth), social (charitable contributions, employee welfare, and fair trade), and environmental (environmental friendly materials and wastes, and land use). The bottom-line refers to the ‘profit or loss’ amount appears on a financial report. TBL says that monetary profit means nothing if the government spend more money to clean up the rivers or to pay health care caused by the company’s wastes or pollutions. Elkington (1999) also introduced the phrase ‘People, Planet, Profit’ or 3P and connected it with TBL concept: a business entity should (i) extend good outcome toward people surroundings like the employees and communities (People); (ii) preserve the environment or at least do no activities that can cause degradation to the nature, that eventually will affect the people (Planet); (iii) achieve economic value rather than accounting profit, means that all related costs included social and environmental costs have been accounted for in the profit and loss statement (Profit).

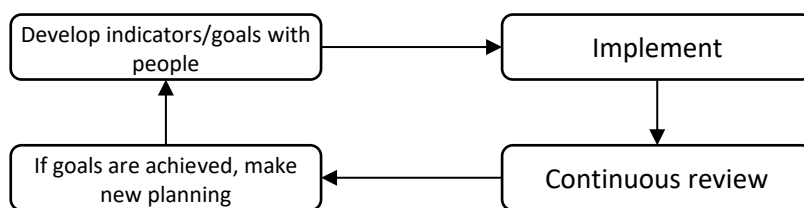
No one has all the expertise in all discipline, and stakeholders should gather together to address the wicked problem. Engaging a community of practice is a great way to build good communication between stakeholders. The notion of Community of Practice (CoP) is coined by Etienne Wenger and Jean Lave (Lave & Wenger 1991) as the basis of social theory of learning to represent regular interactions between people or stakeholders who have similar interest and passion for something, as a medium to learn and at the same time share their knowledge and experiences (Wenger 2009). A CoP consists of practitioners or ‘doers’. The members are the ones who repetitively perform their particular skill or engage in a particular issue, and they gather to exchange a shared repertoire of resources: experiences, new ways to manage a particular issue, what kind of problems that may occur and how to address them (Wenger 2009).

Communities of Practices can be conducted in all stages of water management during planning or designing, executing, and monitoring. This is important to build the sense of believing, behaving, and belonging to the community and the domain (Plaskoff 2003 in Hara 2008). Technical experts, central and local government officials, NGOs, foreign funders, water companies and some representatives of the people can gather together and develop a CoP to share their passion in developing better water provision. Wenger in *Communities of*

⁷ The Stakeholder Theory by R. Edward Freeman in *Strategic Management: A Stakeholder Approach*, 1984

Practice: Learning, meaning and identity explains that identity of the CoP can be developed from the members background (their expertise and experiences), connected and expanded through relationships and interactions between, and the meaning of the CoP itself can be mutually negotiated through participations in practice and reifications of meaning (Paul 2002; Wenger 1998). Wenger (1998) describes that a CoP is a good place for natural negotiation as well through a process of participation and reification, as members have establishing mutual engagement, bounded by a sense of joint enterprise, and produce a shared repertoire of resources (Roberts 2006).

Developing CoP to build wellbeing stocks for the future through the Triple Bottom Line as detailed in 'Planetary Passport' (McIntyre-Mills, 2017 in press) enables planners and policy makers to work with service users so as to co-develop better indicators of perceived need and then to apply and manage their implementation from above and below. This is core to better governance which relies on a priori norms and a posteriori measures that are made with the service users. The continuous planning cycles can be performed in 4 steps:



Water: a public good, a common good, or a commodity?

Who owns the water? It is always difficult to answer this question in modern context. For centuries throughout our history, water was and will always be considered as *res omnium communes*, which means that water is for all (Schelwald-van der Kley 2009, p. 88). However nowadays, the way nations treat water has moved to be more like a commodity, which provided by public or private companies.

On 28 July 2010, the United Nations formally stated through a resolution that the UN: '*recognizes the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights*'⁸. The UN also urges all countries and international bodies to provide all necessary supports to developing water sector especially in developing countries.

Debates whether water should be regarded as a public good or commodity occurred for decades. Shiva (2002, p. 20) claimed that people's right to water is a natural right, so it 'arises as human nature, historic conditions, basic needs, or notions of justice, and it is not originate with the state'. Shiva added that 'water must be free for sustenance needs, free of cost', and making profit from water is harming our nature. Bakker (2003, p. 18) puts it very clearly: water business regards water as a product, and treats citizen as individual customer rather than collective. While others suggest that imposing charge on water is needed so water industries can maintain their service of water, and hence will be able to satisfy the human right for water (Gleick 2013; Gray 2008, p. 3). Rogers, De Silva and Bhatia (2002) challenge the old view that water price will harm equality. They argued that full price policy integrated with economics, legal and environment management will put water to the highest valuable uses and improve equity and sustainability of supply.

⁸ United Nations Resolution Number 64/292: The Human Right To Water and Sanitation. Moreover, there is also a statement from the United Nations Committee on Economic, Cultural and Social Rights (2002): '*Water is a limited natural resource and a public good fundamental for life and health. The human right to water is indispensable for leading a life in human dignity*'.

Yet Quilligan (2012) explains that with increased moves towards neoliberalism policy now seeks to define goods as private goods and the term 'public' has shifted from 'people' to 'the government'. It means that the goods that are supposed to be acquired and organized collectively by the communities, are now controlled centrally by the government. Community empowerment to manage water is ignored, and the government merely choose the simplest way: sell it. The constitution has explicitly mandated that water should be 'controlled by the government', but with further restriction 'for the maximum benefit of the people'. Water can be a common good if the government encourage the communities to be self-providing, shared by negotiating their own rules and norms, as enjoying drinking water can be rivalrous and excludable. This is aligned with the subsidiarity principle, which recognises that individuals should be empowered to deal and to overcome their problems that are affecting them. Subsidiarity in governance requires organisations that are closest to individuals should be given the authority to make decisions and manage their own affairs, and discourages centralisation and empower local government (Bosnich 1996; Evans Dr 2013).

As a market good, the pricing of water is a consequent, and it has to be done properly and carefully. Gleick mentions that: 'The failure to properly price water leads to inefficient use, overconsumption, environmental degradation, inadequate investment to maintain and expand services, and inappropriate subsidization of some users at the expense of others' (2013, p. 14). Public Citizen (2003) also provides some cases around the world that applying too expensive tariff will lead to rejection from citizens, and often riots.

The United Nations have been promoting and urging its members to improve their water provision especially provision to marginal people, especially through its *Sustainable Development* program. The UN has proclaimed in 2010 that water right is human right, and then urged its members to ratify the Millennium Development Goals in year 2000 which has a specific water issues: 'Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation'⁹. WHO reported in *Progress on Drinking Water and Sanitation 2012* that the target has been exceeded by 1% in 2012 (the target was 88% of population have access to safe drinking water, while the achievement was 89%)¹⁰. These goals have been amended by proclaiming the UN Sustainability Development Goals (SDGs) which have seventeen agendas (goals), which the sixth goal is *Clean Water and Sanitation: ensure availability and sustainable management of water and sanitation for all*. This goal stresses that in 2030, all people (one hundred percent coverage) will have access to safe and affordable drinking water.

To achieve the target, centralistic system of governance is probably not the best option considering the fact that Indonesia consists of various different local background. Hence, local issues need to be addressed locally by local perpetrators. The subsidiarity principle recognises that individuals should be empowered to deal and to overcome their problems that are affecting them. Subsidiarity in governance requires organisations that are closest to individuals should be given the authority to make decisions and manage their own affairs, and discourages centralisation and empower local government (Bosnich 1996; Evans Dr 2013). Regional and local government should be allowed to enact their regulatory functions and be provided by the resources needed (Vischer 2001).

Methodology

Qualitative methodology will be implemented in this study as it is more appropriate to understand and analyse how a social system perceive a particular issue (Bricki and Green

⁹ See <http://www.un.org/millenniumgoals/envIRON.shtml> Millenium Development Goals, Goal number 7, Target number 7c.

¹⁰(WHO/UNICEF 2012)

2007), in this context, water management in Nauli City. The main advantage of qualitative analysis is the ability of this method to examine problems or research questions in depth (Cleary, Horsfall & Hayter 2014). To be more specific, Bricki and Green (2007, p. 7) suggest that qualitative methodology is better to (1) absorb the human perspective; (2) observe their reaction to the context, and (3) get deep understanding on a process.

Data used in this paper are primary data which includes interviews and other field data gathered through Simbolan's field work in Nauli City and Jakarta during November to January 2015, and also secondary data like reports (financial reports and statistics), news clippings. In-depth interviewed have been conducted to allow interviewer and interviewees to elaborate more deeply about the topic (Berg 2001; Bryman 2012; Patton 1990; Yin 2013). Meanwhile secondary data are also essential as official data and information, opinions from people in charge, as well as knowledge that have been previously published for other intentions, will help to support and reshape analysis, and offer time and financial saving (Castle 2003; Heaton 2003; Hyman 1972; Vartanian 2010).

Analysis in this paper is divided in three stages. Firstly, it applies the critical systems thinking method to examine 'what is the case' and 'what ought to be the case' in Nauli City water management through the twelve questions of Critical System Heuristics (CSH) introduced by Werner Ulrich (Ulrich 1983). Then the problem will be examined using two methods: (i) Carlo Bacchi's *What's the problem represented to be* approach or the WPR approach (Bacchi 2009); and (ii) Drawing a Problem Mapping to see the aspects, cause and effects, and relationships between them (Horn 2001). Finally this paper will conduct a policy analysis in order to address the problem.

'What's The Problem Represented to Be' (WPRB) approach

One way to formulise the problem is with Carol Bacchi's '*What's the problem represented to be?*' (WPRB) approach (Bacchi 2009). This approach challenges the old view that a policy is a reaction or response to a problem. Instead, a policy should critically scrutinise the problem. The WPR approach consists of six interrelated questions as follows:

Q1: What is the 'problem' represented to be?

Policies are not made to solve problems but a problem is part of the policy. Furthermore, the policy represents the problem and how the problem is represented will determine how the issue is thought about, how the government perceive and react to the problem, and how the affected people are treated. For example, if sending polices and troops is the chosen policy action for lowering thieveries, then the problem representation is robberies happened because of low law enforcement (Bacchi, 2009, pp. 1-3).

Q2: What presuppositions or assumptions underlie this representation of the problem?

A problem representation should be underpinned by assumptions or presuppositions that are taken-for-granted or unquestionable. For example, nature vs culture, public vs private, male vs female, economic vs social, legal vs illegal, national vs local, and centralized vs decentralized. For example the concept of 'Health', people can perceive it as a public vs private commodity, or a concept of wellbeing rather than a simple illness treatment.

Q3: How does this representation of the problem come about?

The purpose of Question 3 is to highlight why a problem representation can gain a popularity or dominance. It examines the origins or the history of the represented problem.

Q4: What is left problematic in this problem representation? Where are the silences? Can the 'problem' be thought about differently?

As the nature of social problems that can be regarded as wicked problems, a specific problem has surroundings issues that often (maybe) forgotten or ignored by policy makers that have to be identified properly. This question can also be used to reveal some restrictions in problem representation.

Q5: What effects are produced by this representation of the 'problem'?

It is assumed that a problem representation will affect a group of people more than other group of people. Policy makers should assess and prepare policy action to anticipate them.

Q6: How/where has this representation of the 'problem' been produced, disseminated and defended? How has it been (or could it be) questioned, disrupted and replaced?

This question tries to question and challenge the problem representation. Every problem representation cannot accommodate various ideas, issues and interests of different stakeholders.

The WPR approach has helped us to represent the problem and understanding fundamental issues behind the problem which are ignoring the constitution mandate and problem in decentralisation implementation. Then we need a problem map that will put forward the nature of the problem as 'wicked', which connects the causes and effects, and shows the interrelations between primary causes and secondary causes.

Problem Mapping

The answers of the WPR approach six questions of are very useful as a guidance to observe the problem better. In the previous chapters the researcher has mentioned that water management problems in Nauli City can be regarded as a wicked problem.

In order to understand the mess or the wicked problem, performing mapping is essential. Horn (2001) explains that a problem map is important to describe the cross-boundary map that shows how the situations, events, and phenomena are interrelated one another, as an executive summary of the mess. The wicked problem map can:

1. Structure the flow of complex discussions
 2. Enable decision makers to see causal connections, and find interconnections between sectors and situations;
 3. Incorporate perspectives from different stakeholders
 4. Maintain the big picture when discussions enter the details
 5. Give quick information for newly involved person to catch up.
 6. Help members to explain the wicked problem to their colleagues
- (Horn & Weber 2007).

Furthermore Horn and Webber described steps to formulise the problem map. First, conducting data collection from documents, interviews and group discussions, and analyse the data. Second, identifying problems, situations, and perceptions. From the data collection processes, the conditions that are occurred in the field or in the society and the perceptions of different stakeholders from different point of views can be pictured and be put in different boxes. Third, making causal links or connections between boxes. This can be done over and over again, until we find the best arrangement and interconnections between problems.

Critical System Heuristics

A systems approach begins when first you see the world through the eyes of another. (Churchman 1968, p.231).

Understanding a wicked problem is best by thinking systemically to address several points of view or relevant aspects like social, economic, and political (Jackson 2000; McIntyre-Mills 2006, 2014a,b, 2017). In the systems thinking, a problem is a part of a bigger system with several interrelated subsystems with their own problems (Churchman 1979). Systems thinking approach was introduced to criticise the conventional approach – mechanism approach – that simplify solutions by dismantle the problem into smaller parts and address them separately (Midgley 2000). According to Reynolds and Holwell (2010) there are three traditions of systems thinking: hard systems, soft systems, and critical systems.

Hard Systems or Systems Engineering believes that the world is constructed by interrelated systems and they can be engineered, while Soft Systems Methodology (SSM) considers that those systems cannot be engineered because they often have conflicting values and worldviews (Checkland & Poulter 2010). Critical Systems Heuristics (CSH) also agrees about the conflicting worldviews of the systems, and proposed that a critical approach is needed since there is no single right way to make decisions on a wicked problem, and it really depends on assumptions and perspectives (Ulrich 2005). Boundaries should be established by analysts self-critically or critical to other people judgements in order to sweep-in to the contexts, to unfold all relevant aspects, as well as to exclude irrelevant information (Ulrich 2005; Ulrich & Reynolds 2010). Moreover setting up critical boundaries will justify which stakeholders and decision makers to include or exclude (Churchman 1970). CSH introduces twelve heuristics questions to examine ‘what is the case’ and ‘what ought to be case’ of the problem as follows¹¹:

a. The sources of motivation

1. Beneficiary → Whose interests that ought to be / are actually served?
2. Purpose → what ‘is’ / ‘ought to be’ the purpose of the system?
3. Measure → what ‘is’ / ‘ought to be’ the actual (built in) performance measurement of the system? How can we measure that the program’s consequences create improvement?

b. The sources of control

4. Decision maker → Who ought to be/is the person or people that has/have power to determine the direction of the program?
5. Resources → what resources or conditions ‘ought to be’/‘are’ controlled by the decision maker?
6. Environment → what ‘are’ / ‘ought to be’ the conditions that the decision maker cannot control?

c. The source of expertise

7. Expert → who ‘is’ / ‘ought to be’ the planner?
8. Expertise → what kind of skills and knowledge that ‘is’ / ‘ought to be’ needed/relevant?
9. Guarantor → where ‘do’ / ‘should’ the people involved seek the guarantee that their planning will be successful?

d. The sources of legitimation

10. Witness → who ‘is’ / ‘ought to be’ the (negatively) affected people but not involved in the system?
11. Emancipation → ‘Are’ / ‘Should’ the affected people ‘be’ given the opportunity to emancipate themselves into the system?
12. Worldview → On what worldviews ‘is’ the system / ‘ought’ the system ‘to be’ based?

Findings

As a wicked problem, the provision of drinking water and its management is a problem in Nauli City that comprises several inter-related problems, namely: financial, social and environment problems.

¹¹ Adapted from ‘*Dimensional analysis of the sources of intentionality that determine the meaning of improvement*’, Ulrich (1996)

Financial problem: the commodification of water

Drinking water has been a profitable commodity in Nauli City due to the arid and dry climate condition and deteriorated by the failure of the government to manage drinking water issues. When the field visit was conducted in 2015, there were five water sellers that sold water to the residents: government-owned water companies (City PDAM, District PDAM, and Provincial BLUD SPAM), the trucked-water merchants, and the DAMIU¹² or water stalls.

From the explanation above, it cannot be refuted that competition has occurred in water market in Nauli. Table 3 below tries to compare and contrast tariffs, market share, and profit earned from water market in Nauli.

Table 2 Comparison of market share, revenue and profit between five water sellers in Nauli

Perpetrators	Avg tarif (Rp/m3)	Vol sold (m3)/year	Market Share	Revenue (Rp)	Profit (Rp)
City PDAM	7,500	794,397	10.8%	5,967,979,372	513,928
District PDAM	5,000	6,072,140	82.7%	29,753,486,000	1,758,292
BLUD SPAM	2,500	129,600	1.8%	283,400,000	0
DAMIU	200,000*	82,334	1.5%	16,468,800,000	11,116,440,000
Water tank	20,000	240,000	3.3%	4,800,000,000	2,880,000,000
Total value of water sold in Nauli				89,193,865,372	
*: DAMIU tariff is Rp4,000 per 20 litre.					

Undoubtedly the public operators' tariffs are much lower than of the private sectors. And in terms of profit, the private sectors which very small market share can gain huge amount of net income compared to those of the water utilities, and it can be meant that their tariffs are very expensive or much higher than their cost of production. So why is this happening when the constitution mandates water service to the government?

The failure of the governments to manage water in Nauli City has resulted in a huge opportunity loss to the economy especially to the people. If we recall the information provided in Table 2 above, people bought water from water merchants 320,000 cubic meter per year for Rp.21.2 billion. If we convert it to buying water from the public water companies with water tariff Rp7,500 per cubic meter, then the total payment will be Rp2.4 billion. It means there was already Rp.19 billion opportunity loss that could be received by the public companies and be utilised to develop more sophisticated water provision or reached the poor. Just for an easy comparison, that amount of money equals more than three times of the City PDAM total revenue. Or else, connection fee that is charged to connect a new customer to PDAM pipe network is Rp 1.5 to 2 million, which means that the money can connect more than 10,000 new customers for free. Or else, if one person needs 100 litre per day and 36,500 liter per year or 36.5 cubic meter per person per year, then that money can be used to provide free water to 8500 person per year, and if one household consists of 5 person then 1700 poor households could have been getting free water. If we compare it with the municipality 2015 budget, the opportunity loss was nearly as much as total retribution revenue of Rp 21.6 billion, or five times annual total subsidy expenditure of Rp4.5 billion, much bigger than budget allocated for several functions for example Transportation (Rp8, 3 billion), Social Security (Rp9.5 billion), and 26 other functions as shown in the figure below.

¹² DAMIU stands for Depot Air Minum Isi Ulang.

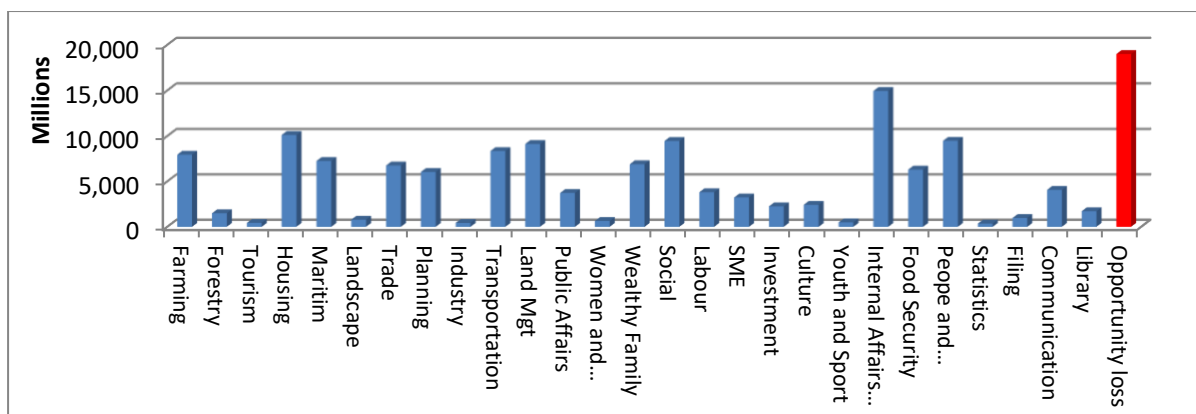


Figure 2 Comparison between the Opportunity Loss against 27 functions budget in Nauli City Government's 2015 budget allocation

Social problem: poor quality of water

"All people, whatever their state of development and their social economic and conditions, have the right to have access to an adequate supply of safe drinking water." --

United Nations Water Conference, water as a right, 1977.

The Environment Control Body of Nauli Municipality during June to November 2014 had conducted laboratory test to sampled water from 100 households' waters that were used by the residents for their domestic needs (sourced from rivers, springs, wells, trucked water, PDAMs and BLUD SPAM). One page of its report is shown below.

Tanggal Sampling		Selasa, 25 November 2014													
Lokasi		Sumur Gali di Kelurahan pasir Panjang, Kecamatan Kota Lama													
No.	Kode Sampel	Koordinat		Waktu Sampling (WITA)	Suhu Udara (°C)	Parameter Lapangan						Parameter Laboratorium Mikrobiologi			Ket.
		S	E			Suhu Air (°C)	pH	DHL µS/cm	TDS mg/L	Salinitas mg/L	DO mg/L	TSS mg/L	Fecal Coliform /100 mL	Total Coliform /100 mL	
1	SGL Nov 1	10° 09' 131"	123° 36' 031"	08:47	30.0	28.6	7.22	8450.00	4076.67	5303.33	6.62	14.50	500	11,000	
2	SGL Nov 2	10° 09' 235"	123° 36' 027"	09:12	30.2	28.8	7.42	4428.00	2214.00	2878.67	6.56	14.00	0	40,500	
3	SGL Nov 3	10° 09' 204"	123° 36' 068"	09:45	31.4	28.9	7.38	7130.00	3560.00	4640.00	6.52	16.50	16,500	80,500	
3	SGL Nov 4	10° 09' 156"	123° 36' 244"	11:13	33.4	29.0	7.18	5320.00	2650.00	3453.33	5.59	11.00	0	46,500	

Figure 3 A page of 120 pages report from 2015 Water Inspection Report released by Environment Control Body of Nauli Municipality

First of all, they revealed that all of the water sources in Nauli City were highly contaminated by coliform bacteria and that the contamination reached level of index varied between 5,000 to 80,000. More specifically faecal coliform index spanned from 100 to 20,500¹³ for most of them (83 out of 100 spots). It caused the number of diarrhoea incidences reached 17,526 and ranked 5 of the most frequent diseases in Nauli City (Nauli City Health Profile 2014).

Secondly, not less than 20% of the sampled water contained very high TDS level. TDS stands for Total Dissolved Solids, used to measure the level of minerals (calcium, magnesium, sodium, potassium cations and carbonate, hydrogen carbonate, chloride, sulphate and nitrate anions) that are contained in a litre of water. High TDS in water may affect its taste, and WHO rated the level of TDS in terms of affecting taste: TDS < 300 mg/l as excellent; 300 < TDS < 600 mg/l as good; 600 < TDS < 900 as fair; 900 < TDS < 1200 as poor; and TDS > 1200 as unacceptable. Indonesia Ministry of Health Decree regarding healthy drinking water standard states that the acceptable maximum level of TDS for

¹³ Total Coliform bacteria are common in the environment like soil, water, and vegetables. They are harmless. However a high level of contamination indicates that the source of water should be examined and need to solve the problems. On the other hand *Fecal* coliform contamination indicates that there is high risk of illness for water consumers (Washington State Department of Health 2016). According to the Ministry of Health of Indonesia Decree No. 492/2010 and 739/2010, the coliform index in drinking water should be zero.

drinking water is 500. The report shows that 22 out of 100 water samples contained TDS up to 4500 mg/litre, and the people still used the water for their basic needs. The researcher came to one of households that consumed water with TDS 3547 mg/Lt, and the water was very tasty and turbid as in picture below:



Figure 4 Water with high TDS

High TDS water can increase risk of arthritis or inflexibility in the joints which caused by high calcium and minerals deposits, and also kidneys stone as kidneys are responsible to filter about 180 litres of water everyday (Rozelle & Wathen 1993).

An official of Health Department of Nauli City in an interview¹⁴ stated that the department had never done regular inspection or conducted treatment of water sources, whether it is a commercial, communal, or private water sources because limited budget allocated for it. They checked water sources only when they were asked by users to do so. The local Department of Health claimed that the Community Health Centres have checked and treated at least 90-100 bore wells every year. However the sampled residents (80 households from 24 locations) revealed that none of them were visited by the health officers to do water treatment on their wells. Meanwhile the water merchants and PDAMs confirmed that their water sources had never been tested by the government, so they do not have the incentive to treat the water since they think the water is clean and clear physically.

Environmental problem

Nauli City's geographical condition (arid with very little rain) makes water becomes less available. Ground water exploitation has occurred from time to time sporadically for commercial purposes by manufacturing and service industries, seaports, water companies, and water merchants. The victim will always be the residents that use water for daily basic needs. A resident said: *"Ten years ago we can get water from a shallow bore well only 15 meters deep. However today we have dug for 70 meters, and still in dry season it has no water"*.

The table and graph below show the comparison between the trend of population against rainfall in Nauli City between 2003 and during a five-year period from 2010 to 2015:

Table 3 Population and Rainfall trend from 2010-2015

	2005	2010	2011	2012	2013	2014	2015
Population	251,170	291,794	336,239	365,348	378,425	380,136	390,877
Rainfall (mm)	2215.9	1720.7	1925.6	1561.2	1621.15	1579.1	1290.2

¹⁴ Interviewed on 19 November 2015.

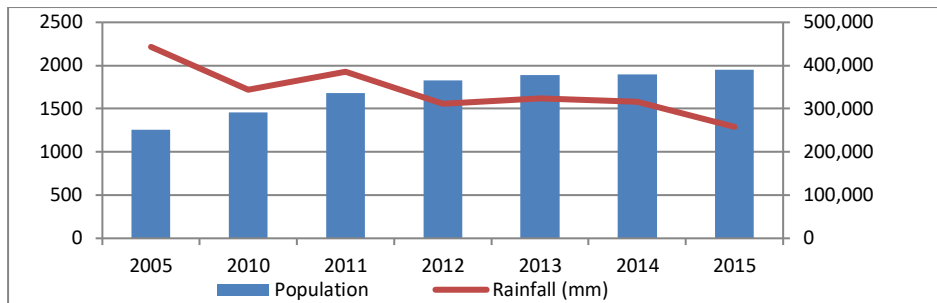


Figure 5 Population and Rainfall trend from 2010-2015

The table and graph indicate that Nauli City has experienced rapid growth in population about 60% in 10 years from 2003 to 2015, however the volume of precipitation was decreasing approximately 40%, which means the availability of water in Nauli City was much less than ten years ago. Like other growing areas in Indonesia, ten years ago people in Nauli City did not get any difficulties to find water with a shallow bore-well or water pump. According to a plumber interviewed in Nauli City, the maximum depth of a hand water-pump to be able to pump water out is 11 to 15 meters depending on the type of the pump.. Meanwhile the residents also have problems with their bore-wells, since they have to drill deeper to find water. A resident explained that currently the bore-well at the back of his house is 70 meter deep, but during the peak of the dry season, sometimes it runs out of water. Most houses in Nauli City have their own wells, and not every resident could afford to build a well since it needed Rp. 35 – 40 million to dig a 70 meter well nowadays. The poorer residents receive their water from other residents by connecting to the water sources using long hoses, or they build communal wells and then share the water.

Data gathered from the Department of Mining of Nauli City stated that as of 2014¹⁵, there were not less than 6000 shallow and deep bore wells all over the city, with various depths from 4 m to 70 m down and each well is commonly shared amongst 3 to 4 households. As per December 2014, only 3100 bore wells have been well documented and most of them belong to the residents, and there are 123 bigger capacity bore wells that were used by commercials or government institutions like the District PDAM (9 wells), the City PDAM (12 wells), the city harbour (2 wells), the airport (4 wells), PT Semen Kupang/ Kupang Cement Co. (3 wells), water merchants (25 wells), and others like banks, university, churches, government's offices, and military barracks.

The Head of Nauli City Environmental Control Board stated, *“If the government, particularly the Department of Mining do not take immediate action regarding this water discharge phenomenon, we will not be able to preserve the environment and in the next 25 years Nauli City will run out of ground water”*. The Head of Mining Department explained that the activities to control water extraction has not been a priority in the local budget, that makes there is no funding allocated for that purpose. He admitted that the time has come for the government to look after the environment in terms of controlling water discharging, but the department has to make prioritisation since its budget was very limited and they need to control other mineral and mining issues. Sea water intrusion has happened in some coastal area and even to higher places in several sub-districts. The researcher found that the people have suffered as the ground water was brackish since two years ago¹⁶.

¹⁵ Final Report of Research on Ground Water Zoning and Development (2015)

¹⁶ Interviewee was from Alay Sub-district, interviewed in 19 November 2015.

Critical Systems Thinking for addressing the wicked problem

The WPRB approach

As explained in Chapter III part 3.6.6 Policy Analysis, Carol Bacchi's *What's the problem represented to be (WPRB)* approach can be applied in order to structure the problem. Table 4 below will try to answer the six guiding questions with the purpose of unravel the mess to formulise the problem.

Table 4 The WPRB approach

Q1	What is the 'problem' represented to be?	The central, provincial and local governments are competing to sell water, not to provide water, to the people. There is no coordination between governments and water companies in providing drinking water.
Q2	What presuppositions or assumptions underlie this representation of the problem?	Water provision is the government obligation as mandated by the constitution. Currently the regulations allow overlapping functions between governments in conducting water provision, and national versus local water policies are not synchronised.
Q3	How does this representation of the problem come about?	It happened since the implementation of decentralisation was not followed by clear division of functions between three levels of government. Then the sub-district of Nauli proliferated into an autonomous city government that made the authority of water provision in Nauli City become unclear.
Q4	What is left problematic in this problem representation? Where are the silences? Can the 'problem' be thought about differently?	Water provision in Nauli City has only been seen merely as governmental functions (programs and projects) and economic (profit making and cost recovery) points of view. Other aspects as social justice, health and environmental have been ignored and left problematic.
Q5	What effects are produced by this representation of the 'problem'?	A policy will not be able to satisfy all groups of people, but it is best if the policy can cover more interests of most people. Replacing or making adjustment to current policy will give advantages and also disadvantages depending on which points of view, but it is desired that it can relieve the burdens of marginal people that have been the affected people for so long.
Q6	How/where has this representation of the 'problem' been produced, disseminated and defended? How has it been (or could it be) questioned, disrupted and replaced?	A new system that addressing various interests from different stakeholders, especially the affected people, should be designed, and then evaluated regularly to make improvements.

Mapping the Problem

The wicked problem will be structured in several levels based on their cause and effect, to see the connection between them and how one aspect has impacts to other aspects. The problem map is presented as follow:

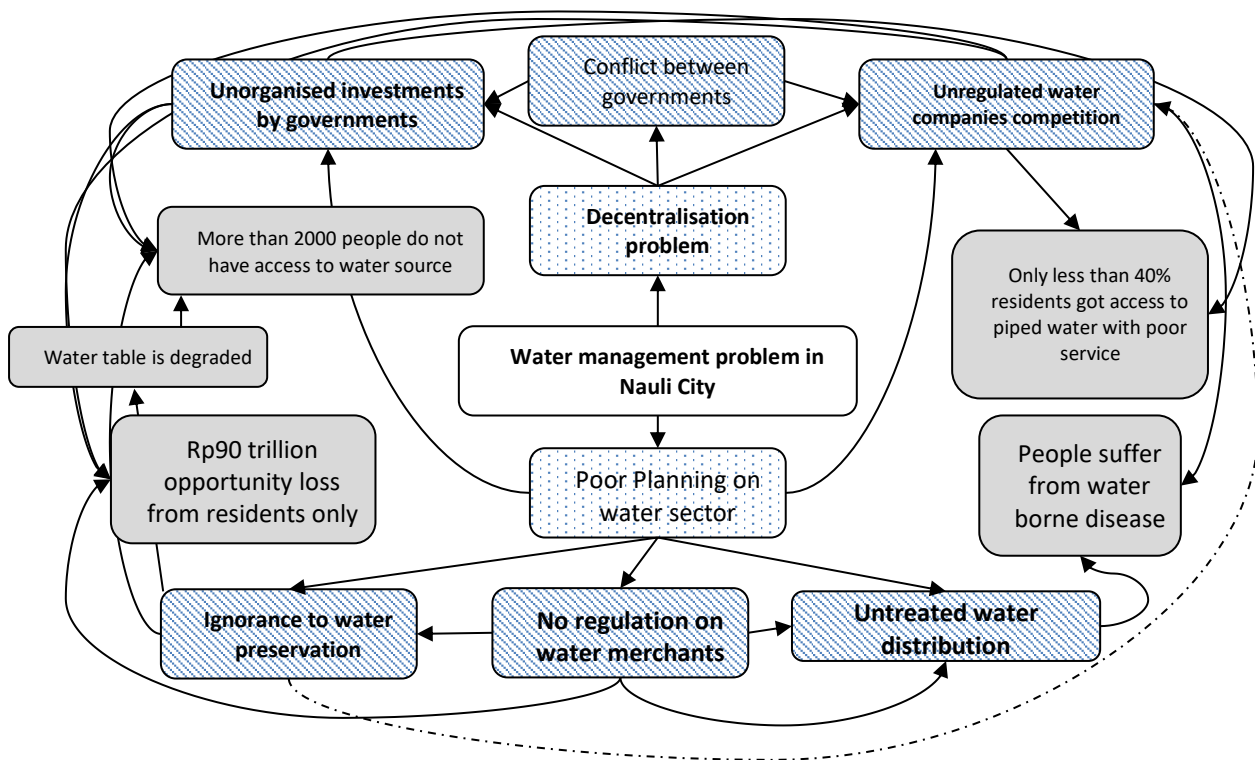


Figure 6 The Problem Map

In the map, there are 3 different types of boxes: (i) the shaded boxes which are the effects; (ii) the dot patterned boxes which are the primary causes; and (iii) the line patterned boxes which are the secondary causes.

The effects: shaded boxes

The shaded boxes are the conditions that happened in the society as a result of the governments' water provision performance. There are five shaded boxes: (i) more than 2000 people do not have access to safe water. (ii) More than 90 trillion rupiahs opportunity loss from the resident's pocket. (iii) Less than 40% of residents got access to piped water with poor service. (iv) people suffer from water borne diseases. (v) water table is degraded.

The Primary Causes (dot patterned)

The Primary Causes are the root of the wicked problem from the governments' side as one of stakeholders. Of course there are other stakeholders that need to be taken into account like the residents and the private sectors, however as James Maddison said: "the essence of government is power...", and Kaufmann, Kraay and Mastruzzi (2009) define governance as the institution(s) that exercise the authority or power¹⁷. Kaufmann et al (2009) also stated that

¹⁷ Kaufmann, Kraay and Mastruzzi (2009) describe six dimensions of governance: (i) Voice and Accountability, that represent the freedom of citizens to express their minds and participate in selecting the government; (ii) Political Stability and Absence of Violence, that represent the unlikelihood of violence to happen in order to destabilise the political condition; (iii) Government Effectiveness, represents how effective the government in providing public services, the quality of making, implementing, and committing on policies in public service provision; (iv) Regulatory Quality, represents the effectiveness of the government to make and implement policies to encourage the development of private sector; (v) Rule of Law, represents the effectiveness of law enforcement conducted by government officers and the parliament members as well; (vi) Control of Corruption,

the government effectiveness and regulatory quality represent the work of a government in providing public services with adequate regulations followed by law enforcements. These functions have not worked well and have been the Primary Cause of water management problem in Nauli City. The map shows that there are two Primary Causes that significantly triggered further causes (secondary causes): (1) Decentralisation problem. Following Nauli City proliferation from Nauli District, the current regulations were not ready to accommodate issues and conflicts between the new and parent governments, while central and provincial governments were not capable enough to mediate the conflicts; and (2) Poor planning in the water sector. As admitted by the Nauli City Government Planning Agency, there has been no master plan in drinking water management, and hence there are huge gaps in regulation regarding water issues.

Secondary Causes (line-patterned boxes)

The Secondary Causes are the conditions that are triggered by the Primary Causes, and are the causes for the effects, which are in the line-patterned boxes. From the first primary cause “Insufficient regulation on proliferation”, we can derive the secondary causes are: (1-i) Conflict between governments, that is conflict of interest in providing public services between the City Government of Nauli City and the District Government of Nauli City; (1-ii) Unregulated public water companies competition: PDAM of Nauli City, PDAM of Nauli District, and Provincial BLUD SPAM; (1-iii) Unorganised water investment by governments. The central government has spent huge amount of money to encourage the development of community based water management, however it has not been well organised and well maintained and they have been mistreated and neglected. Meanwhile from the second primary cause “Municipality has no master plan in water sector”, we can draw three secondary causes: (2-i) Ignorance to water preservation; (2-ii) Untreated water distribution; (2-iii) No regulation on water merchants.

Applying Werner Ulrich’s twelve Critical Systems Heuristics (CSH) Questions

The WPR approach and the problem mapping have attempted to portray the wicked problem in Nauli City water management.

The twelve CSH questions is applied to determine relevant boundaries critically, in order to understand what is/ought to be the case, and who are the involved and the affected people of the problem. Addressing the problem based on the presentation of the previous two methods, we can draw how the twelve CSH questions shifting paradigms from “is” conditions to “ought to be” conditions as follows:

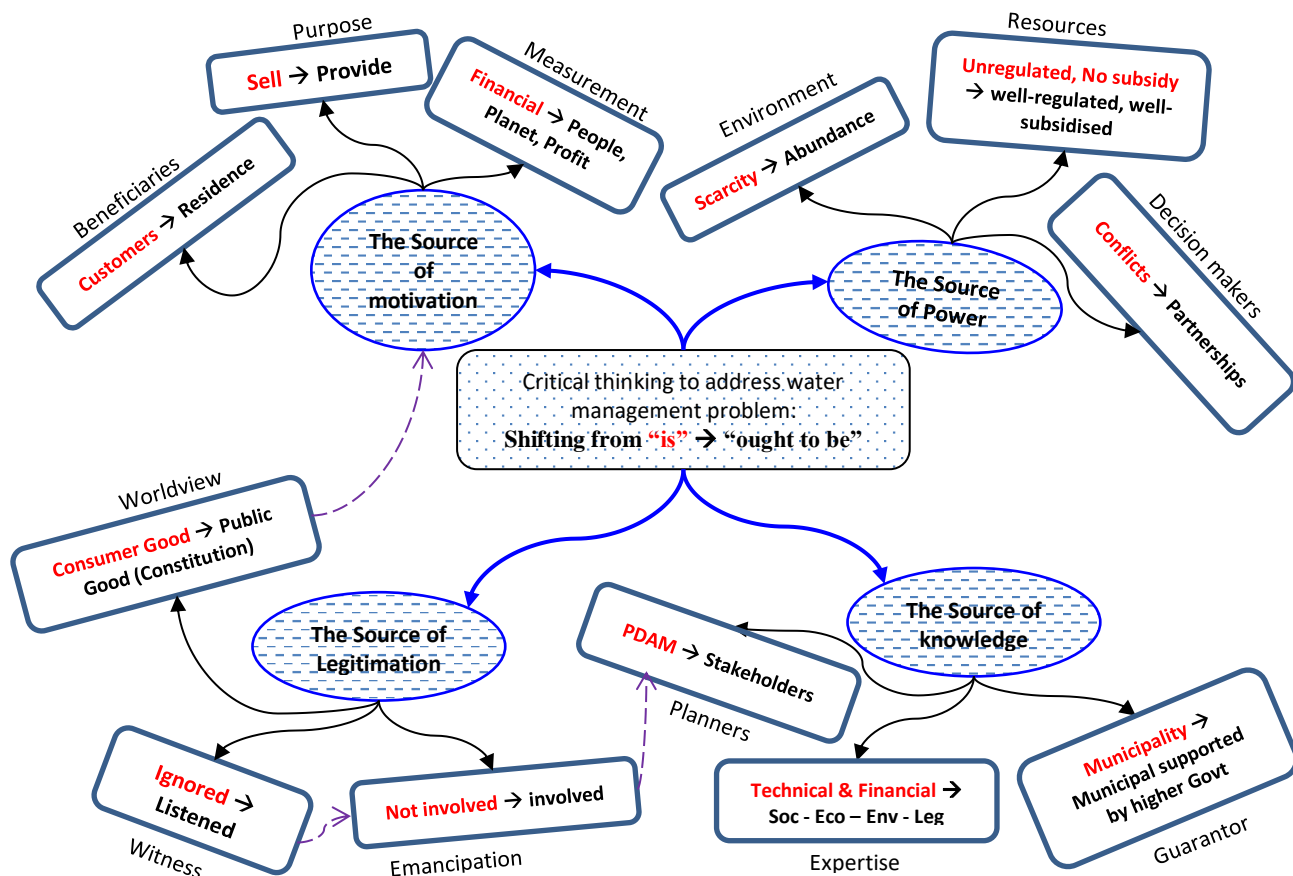


Figure 7 Addressing the wicked problem with CSH

The CSH enables making sense of an area of concern and addressing the wicked problem as the twelve questions will set boundaries in further analysis so we can sweep in as much relevant information as possible (Cabrera 2006). In social context, setting up the boundaries will allow us to include relevant stakeholders and most importantly, decision makers (Churchman 1970).

The Source of motivation

1. Beneficiaries: The government as water provider should realise that the actual beneficiaries of the system is not 'customers', but instead the 'residences' or the people.
2. Purpose: Public service includes water provision is the responsibility of the government, so the main function is to 'provide' rather than to 'sell' water.
3. Measurement: Water provision is performed by water companies and hence, financial indicators are used to measure their performance. This measurement system has to be replaced by balancing the effort to get profit with addressing social issues and conserving the environment, and the Triple Bottom Line (TBL) can be a good alternative.

The Source of Power

4. Decision Makers: The governments (central, provincial, district and city) should not be involved in conflicts, but they need to establish partnerships to build sophisticated water provision to the people.
5. Resources: Making regulation and allocating budget are the resources that the government should utilize. Strong regulations in water management are needed to overcome social, economic, and environment problems, poor coordination and also law

enforcement. Furthermore, allocating more funding and applying cross-subsidy system can help the poor to have access to reliable water.

6. Environment: Conditions that cannot be controlled can also be resources if managed properly. The local government can develop the Blue Economy concept that promotes creativities of the people, in order to turn water-scarcity to water-sufficient by assisting and encouraging the people to build home water catchment, and replanting idle land with water-saver plants. Indeed, research is needed and this should be handled by the government.

The Source of Knowledge

7. Planners: The City Government that currently relies on PDAM's planning, has to establish a comprehensive planning by involving people not only with various expertise but also experience. They can be from NGOs, universities, consultants, international organizations, including the affected people. Further, a Community of Practice should also be developed to maintain good communication between the planners.
8. Expertise: Planners consist of people who are expert in climatology, legal, financial, environment conservation, sociology, and also have experiences in local water service.
9. Guarantor: Applying the principle of subsidiarity, the implementation of decentralisation system should empower the City Government to make sure that the program can be executed properly, and it needs full support from the provincial and central government.

The Source of Legitimation

10. Witness: The affected (poor and marginal) people should not be ignored, but instead they need to be given the opportunity to raise their voice especially regarding their needs of water.
11. Emancipation: The affected people should be involved and their representation needs to be invited in the planning process, as they are one of the stakeholders of the system.
12. Worldview: Who owns the water? The constitution has mandated that the state has full control over water, and should be utilize for the maximum benefit of the people. Hence the mindset saying 'water is consumer goods', should be replaced with 'water is for all', and it is coming back to the first question, the beneficiaries are all people, not a group of people.

Conclusion

The Indonesia Constitution has mandated that water should be fully controlled by the state and should meet needs of the people. By this the constitution means all people. However the government has considered water as a commodity and relied water provision only on water companies. As a result as the nature of a company is to maximize profit, the performances of the water companies were determined by the profit/loss per se. Quality of water distributed and environmental preservation were neglected which triggered more social, financial, and environmental problem arisen amongst the people. The WPR approach has tried to present the problem and the problem map has also tried to study and examine the interconnections of aspects surrounding the problem.

The CSH approach enables a way to understand and to address the wicked problem in Nauli City water management. The 12 CSH questions have been applied to examine the way in which the problem has been defined and to re-draw the boundaries by questioning what is the case and what ought to be the case? The analysis demonstrates that policy and practice needs to pay more attention to the affected people, to perform more comprehensive planning in water sector by involving relevant stakeholders and by preserving the environment in every decision making process, and finally to revisit the responsibility of the government to

provide water to all as a public right as mandated by the Indonesia Constitution, rather than focusing on its commodification and sale for profit.

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