

LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING

Judul karya ilmiah (paper) : A Roadmap to Effective Climate Change Adaptation
 Jumlah Penulis : 1 orang
 Status Pengusul : **Rukuh Setiadi**
 Identitas prosiding : a. Judul Prosiding : IOP Conference Series:Earth and Environmental Science
 b. ISBN/ISSN : 1755-1307 (Print)
 1755-1315 (Online)
 c. Tahun Terbit/tempat pelaksanaan : Vol.129, Issue 1, Maret 2018
 d. Penerbit/organiser : IOP Publishing
 e. Alamat repository PT/web :
<http://iopscience.iop.org/article/10.1088/1755-1315/129/1/012041>
 f. Terindeks di (jika ada) : SJR 0,17 (2018) dan
 SNIP 0,54 (2018)

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 (beri ✓ pada kategori yang tepat) ☐ *Prosiding* Forum Ilmiah Nasional

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Komponen Yang Dinilai	Nilai Maksimal <i>Prosiding</i>		Nilai Akhir Yang Diperoleh
	Internasional	Nasional	
	30	<input type="text"/>	
a. Kelengkapan unsur isi paper (10%)	3		2
b. Ruang lingkup dan kedalaman pembahasan (30%)	9		8,5
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	9		8
d. Kelengkapan unsur dan kualitas terbitan/prosiding (30%)	9		8
Total = (100%)	30		26,5
Nilai Pengusul : 26,5			

Catatan Penilaian paper oleh Reviewer :

- Paper secara umum telah mengacu pada standar publikasi IOP conference series EES, dimulai dengan pengantar, literatur, diskusi dan kesimpulan. Namun tidak terdapat bagian yang menjelaskan metode dan tidak terdapat acknowledgement. Isi sesuai dengan judul mengenai upaya adaptasi perubahan iklim.
- Lingkup pembahasan paper terkait dengan adaptasi perubahan iklim yang efektif relevan dengan konferensi internasional yang diselenggarakan, yaitu ICC (International Conference on Climate Change). Pembahasan didukung 28 referensi yang sebagian besar adalah luaran 10 tahun terakhir. Lingkup pembahasan sesuai dengan bidang ilmu penulis khususnya di bidang Perencanaan Wilayah dan Pengelolaan Lingkungan.
- Data dan referensi yang digunakan sangat cukup up to date untuk prosiding terindeks scopus, Namun metode pengembangan analisis tidak dijelaskan, Paper ini memiliki similarity index sebesar 11%.
- Kualitas terbitan dari prosiding sangat konsisten dengan topik perubahan iklim. Prosiding terindeks *Scopus* (IOP Series) dengan SJR 0,17 tersedia *online* dan *open access*. Prosiding dilengkapi dengan ISBN, DOI, dan terkategori internasional.

Semarang,
 Reviewer 1,



Dr.-Ing. Wiwandari Handayani, ST, MT, MPS
 NIP. 197605252000122001
 Departemen PWK, FT. Undip

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Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal <i>Prosiding</i>		Nilai Akhir Yang Diperoleh
	Internasional	Nasional	
	30	<input type="text"/>	
a. Kelengkapan unsur isi paper (10%)	3		2
b. Ruang lingkup dan kedalaman pembahasan (30%)	9		8,3
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	9		8
d. Kelengkapan unsur dan kualitas terbitan/prosiding (30%)	9		8,5
Total = (100%)	30		26,8
Nilai Pengusul : 26,8			

Catatan Penilaian paper oleh Reviewer :

- Semua unsur utama kelengkapan paper telah terpenuhi sebagai suatu karya ilmiah.
- Pembahasan dari paper mengenai pengembangan kerangka adaptasi perubahan iklim di perkotaan yang efektif sangat komprehensif dan relevan dengan kebutuhan respon atas perubahan iklim.
- Metode yang dikembangkan dalam paper sangat tepat dengan tujuan paper untuk mengembangkan framework analisis, dimana banyak bersandar pada temuan-temuan ilmiah dan literature terkait secara luas.
- IOP Conference Series EES sebagai outlet prosiding ICCG secara konsisten hanya menerima paper dengan topik perubahan iklim dengan peer review yang sangat konsisten dan konstruktif serta paper ini memiliki similarity index sebesar 11%.

Semarang,

Reviewer 2,



Ir. Jawoto Sih Setyono, MDP
 NIP. 196605061995121001
 Departemen PWK FT. Undip

LEMBAR
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Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Reviewer		Nilai Rata-rata
	Reviewer I	Reviewer II	
a.Kelengkapan unsur isi paper (10%)	2	2	2
b.Ruang lingkup dan kedalaman pembahasan (30%)	8,5	8,3	8,4
c.Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	8	8	8
d.Kelengkapan unsur dan kualitas terbitan/prosiding (30%)	8	8,5	8,25
Total = (100%)	26,5	26,8	26,65
Nilai Pengusul : 26,65			

Reviewer 1,



Dr. -Ing. Wiwandari Handayani, ST, MT, MPS
 NIP. 197605252000122001
 Departemen PWK FT.Undip

Semarang,

Reviewer 2,



Ir. Jawoto Sih Setyono, MDP
 NIP. 196605061995121001
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





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Volume 129, Issue 1, 19 March 2018, Article number 012041
International Conference on Climate Change 2017: Challenges and Opportunity on
Environment Degradation Researches, ICCO 2017; Best Western Premier Hotel Surakarta;
Indonesia; 24 October 2017 through 26 October 2017; Code 135643

A roadmap to effective urban climate change adaptation (Conference Paper)

(Open Access)

Setiadi, R. 

Department of Urban and Regional Planning, Diponegoro University, Jl. Prof. H. Soedarto, Tembalang, Kota
Semarang, Central Java, 50275, Indonesia

Abstract

View references (28)

This paper outlines a roadmap to effective urban climate change adaptation built from our practical understanding of the evidence and effects of climate change and the preparation of climate change adaptation strategies and plans. This roadmap aims to drive research in achieving fruitful knowledge and solution-based achievable recommendations in adapting to climate change in urban areas with effective and systematic manner. This paper underscores the importance of the interplay between local government initiatives and a national government for effective adaptation to climate change and takes into account the policy process and politics. This paper argues that effective urban climate change adaptation has a contribution to build urban resilience and helps the achievement of national government goals and targets in climate change adaptation. © Published under licence by IOP Publishing Ltd.

SciVal Topic Prominence ⓘ

Topic: Climate Change Adaptation | Urban Climate | Adaptive Capacity

Prominence percentile: 99.877 ⓘ

Indexed keywords

Engineering
uncontrolled terms

- Adaptation to climate changes Climate change adaptation Local government
National governments Policy process Urban areas Urban climates Urban resilience

Engineering main
heading:





Climate change

ISSN: 17551307
Source Type: Conference Proceeding
Original language: English

DOI: 10.1088/1755-1315/129/1/012041
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Extending Urban Development
on Water: Jakarta Case Study

Setiadi, R. , Baumeister, J. ,
Burton, P.
(2020) *Environment and
Urbanization ASIA*

The optimization of the tangguh
coastal village development
program as an effort to develop
coastal areas

Wisnaeni, F. , Indarja , Hardjanto,
U.S.
(2020) *AACL Bioflux*

Governance reform and climate
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(2019) *Urban Policy and Research*

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To cite this article: 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **129** 011001

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Preface

The International Climate Change Conference 2017 (ICCC 2017) is an event organized by Graduate School of Universitas Sebelas Maret (UNS), Indonesia to mediate the experts, researchers, practitioners, students, and societies to discuss the findings, problems, and solution about climate change. ICCC 2017 addressing the researches relate with climate change to the adaptation and mitigation strategy and the implementation to the societies. ICCC 2017 was carried out at Best Western Premier Hotel, Surakarta city, Indonesia from 24 to 26 October 2017.

ICCC 2017 develops new partnerships and associations with key decision makers across all sectors of climate, and accomodates the latest research findings, as well as the future impacts. The scope of subjects discussed in this conference are: Impact of depletion or enhance of capability of resources of air, water, soil, and vegetation; ecosystem and habitat destruction research; strategy for environmental disaster reduction research; thermal expansion research; climate model and uneven precipitation distribution; pollution and contamination of land surface and atmosphere; carbon footprint, greenhouse gas emission, recycle and reuse energy research; involuntary migration and forced displacement; direct and indirect risks to wellbeing; implication of climate adaptation and mitigation research; infrastructures risks and planning on climate adaptation; policy and legal aspect of climate change; and the economic and social elements of climate change.

The following are the pictures of the ICCC 2017.



Figure 1. Opening by Vice Rector of Sebelas Maret University, Indonesia

International Conference on Climate Change

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ICC 2017

INTERNATIONAL CONFERENCE ON CLIMATE CHANGE 2017

“International Conference on Climate Change: Challenges and Opportunity on Environment Degradation Research”

Environmental degradation is essentially caused by the presence of intervention or excessive human intervention to the existence of the environment naturally. Ruled out this problem and environmental impact in the development of a major factor environmental degradation which has the influence of the social and economic quality. This condition means the climate change will encourage and accelerate disaster and environmental damage.

This Conference aims to accommodate the new related inspiration about how to minimize the climate change and environmental degradation that occurred at this time. Attendees can access practical and valuable information to help them provide an excellent international forum for sharing knowledge and research results in theoretical and practical aspects of climate change and global warming as well as their industrial applications.

Time & Venue

24 – 26 October 2017 at Best Western Premiere Hotel, Solo City, Indonesia.

Keynote Speaker

Dr. David Grimes* President of World Meteorology Organization Geneva, Switzerland	Prof. Bambang Brodjonegoro* Ministry of National Development Planning (BAPPENAS), Indonesia
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Invited Main Speakers

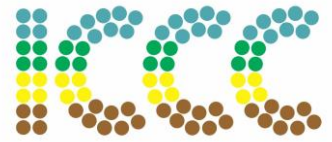
Speakers	Speech Topic
Prof. Dr. Sutarno Universitas Sebelas Maret, Indonesia [download]	Climate Change and Biodiversity
Dr. Dodo Gunawan BMKG, Indonesia [download]	NATIONAL FRAMEWORK ON CLIMATE SERVICES: The Research-based and Scientific-sound Services
Assist. Prof. Takeo Onishi UGSAS Gifu University, Japan [download]	Evaluation of climate change and land cover change impacts on water quality of the Ise Bay and its watershed

Speakers	Speech Topic
Assist. Prof. Dr. Keigo Noda UGSAS Gifu University, Japan [download]	Effects of Climate Change and Socio-economic change to sediment yield – A case of Upper Citarum River Basin-
Prof. Dr. Ir. Patrick Van Damme Ghent University, Belgium [download]	How can (tropical forest) biodiversity help humanity cope with growing climate change challenges - examples from the field
Dr. Anwar Fitrianto UPM, Malaysia [download]	Climate Change in Number: Statistical Point of View
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Climate Change 2017 Event Series

Secretariate: Graduate School Building 5th Floor, Universitas Sebelas Maret,
Jl. Ir. Sutami No. 36A Kentingan, Surakarta, INDONESIA, 57126 Website: <https://iccc.uns.ac.id/>

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Best Western Hotel Premier, Surakarta, Indonesia, 24-26 October 2017

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Affiliation: **Sebelas Maret University, Indonesia**
2. Name: Komariah, PhD.
Affiliation: Sebelas Maret University, Indonesia
3. Name: Prof. Dr. Masateru Senge
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Affiliation: World Meteorological Organization, Division of South Pacific
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2018

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Accepted papers received: 28 February 2018

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Papers

Impact of depletion or enhance of capability of resources of air, water, soil, and vegetation

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Water table depth fluctuations during ENSO phenomenon on different tropical peat swamp forest land covers in Katingan, Indonesia

A Rossita, A Witono, T Darusman, D P Lestari and I Risdiyanto

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Linking climate change to water provision: greywater treatment by constructed wetlands

S Qomariyah, AH Ramelan, P Setyono and Sobriyah

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Y Sunaryo, D Purnomo, M T Darini and V R Cahyani

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U Barokah, U Susanto, M Swamy, D W Djoar and Parjanto

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Leachate pollution management to overcome global climate change impact in Pivungan Landfill Indonesia

Pratomo, Suntoro, T Gunawan and M Maskuri

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Mycorrhizal diversity of stevia (*Stevia rebaudiana* Bertoni) rhizosphere in Tawangmangu, Indonesia

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Land use, climate parameters and water quality changes at surroundings of Code River, Indonesia

Muryanto, Suntoro, T Gunawan and P Setyono

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The effect of nano-silica fertilizer concentration and rice hull ash doses on soybean (*Glycine max* (L.) Merrill) growth and yield

T Suciati, D Purnomo, A T Sakya and Supriyadi

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012010

Soil degradation level under particular annual rainfall at Jenawi District– Karanganyar, Indonesia

A Herawati, Suntoro, H Widijanto, I Pusponegoro, N R Sutopo and Mujiyo

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012011

Study on rhizobium interaction with osmoprotectant rhizobacteria for improving mung bean yield

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012012

Graphical approach to assess the soil fertility evaluation model validity for rice (case study: southern area of Merapi Mountain, Indonesia)

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012013

The effect of pricing level to the loss of welfare costs (case study: Indonesia region II water company)

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Study on osmoprotectant rhizobacteria to improve mung bean growth under drought stress

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Strategy for environmental disaster reduction research**OPEN ACCESS**

012015

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Genetic diversity of pigeon pea (*Cajanus cajan* (L.) Millsp.) based on molecular characterization using randomly amplified polymorphic DNA (RAPD) markers

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012017

Mapping the rainfall distribution for irrigation planning in dry season at pineapple plantation, Lampung Province, Indonesia (Study case at Great Giant Pineapple Co. Ltd.)

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012018

Evaluation of cropping pattern in rainfed areas based on studies of *pranata mangsa* and weather dynamics

M K Zaki, N T Furi, Jauhari Syamsiyah and Sumani

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012019

Assessment of the Standardized Precipitation Index (SPI) in Tegal City, Central Java, Indonesia

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Effects of intermittent acid rain on proline and antioxidant content on medicinal plant "*Pereskia bleo*"

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012027

A climate risk assessment of clean water supply in an urban area: A case study of South Tangerang city, Indonesia

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012028

A Group in Urban: The Social Capital of Ciliwung Depok Community (KCD)

D M Tampi, J Sumabrata, A Zubair and N H Kinan

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012029

Land management on soil physical properties and maize (*Zea mays* L. var. BIMA) growth (An adaptation strategy of climate change)

M K Zaki, Komariah, B Pujiasmanto and K Noda

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High-zinc rice as a breakthrough for high nutritional rice breeding program

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Abstract. WHO reported climate change already takes 150,000 casualties annually, due to the emergence of various diseases and malnutrition caused by food shortages and disasters. Rice is the staple food for almost all of Indonesian citizens, therefore Zn *biofortification* on rice is expected to be effective, efficient, massive, and sustainable to overcome the Zn nutritional deficiency. This study aims to identify rice with high Zn content and yield for further effort in releasing this variety. Ten lines along with two varieties as a comparison (*Ciherang* and *Inpari 5 Merawu*) were tested in Plumbon Village, Mojolaban Subdistrict, Sukoharjo Regency during February-May 2017. The experiment was designed in a Randomized Completely Block Design with four replications on a 4 m x 5 m area, with 25 cm x 25 cm plant spacing using seedling transplanting techniques of 21 days old seeds. The results showed that the plant genotypes treated had differences in yield characteristics, heading date, harvest age, panicle number, filled and un-filled grain per panicle, seed set, 1000 grains weight, Zn and Iron (Fe) content in rice grain. *B13884-MR-29-1-1* line (30.94 ppm Zn, 15.84 ppm Fe, 4.11 ton/ha yield) and *IR 97477-115-1-CRB-0-SKI-1-SKI-0-2* (29.61 ppm Zn, 13.49 ppm Zn, 4.4 ton/ha yield) are prospective variety to be released. *Ciherang* had Zn content of 23.04 ppm, 11.93 ppm Fe, and yield of 4.07 t/ha.

1. Introduction

Climate changes characterized by rising air temperatures and changes in the magnitude and distribution of rainfall have had a wide impact on many aspects of human life [1]. Increased air temperature directly affect the production of cereals including rice, the staple food of the Indonesian population. Indonesia Country Study on Climate Change 1998 [2] reported the vulnerability of agricultural production systems by climate change, as in 1991 and 1994, climate anomaly caused Indonesia to import rice (600,000 tons in 1991 and more than one million tons in 1994). Rice and other cereals are very sensitive to temperature change even in small degree rise. Rice reproductive part called spikelet will become sterile if the air temperature increase, which will affect its productivity [3]. FAO states that climate change, as well as changes in disease patterns and pests, will affect how food production systems will be done in the future. It will also have a direct impact on food security, and poverty levels, especially in countries with dependence on the agricultural sector. WHO reports that



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Assessment of the Standardized Precipitation Index (SPI) in Tegal City, Central Java, Indonesia

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Abstract. One of the adverse impacts of climate change is drought, which occurs more frequently in Tegal city, Indonesia. The application of drought index analysis is useful for drought assessment to consider adaptation and mitigation method in order to deal with climate change. By figuring out the level and duration of the drought. In order to analyze drought in the specific area, Standardized Precipitation Index (SPI) is an index to quantify the rainfall deficit for multiple timescales. In 2015, Indonesia experienced severe drought, which has not been analyzed, yet. Thus, it is important to assess a quantitative evaluation of the drought condition. The study shows that from all deficit periods, the most severe drought in duration and peak took place in 2015, with each drought index as follows: 1 month deficit or SPI-1 (-3.11) in 1985 (-2.51) in 2015, 3 month deficit or SPI-3 (-2.291) in 1995 (-1.82) in 2015, 6 month deficit or SPI-6 (-2.40) in 1997 and (-1.84) in 2015, 9 month deficit or SPI-9 (-1.12) in 2015, 12 month deficit or SPI-12 (-1.19) in 2015. The result underlines the potential that SPI exhibits in drought identification and the use of the rainfall strongly linked to drought relief policy and measure implementation in Tegal city.

1. Introduction

Indonesia, both the rainy and the dry seasons, become the causes of flood and drought in the country. Drought is a characteristic deficiency of the water availability or water supply which results in prolonged shortages in surface or groundwater. It sometimes declared after as few as fifteen days. El-Nino phenomenon affects the drought frequencies, but it is not always referred to a severe drought because there are other factors which generate drought in Indonesia. Such as land use land cover change and rainfall anomaly.

A research Pramudya et al [1] has reported about the conversion rate of wetland into settlements and other land use in Tegal city, Indonesia. It was reported that the recent wetland conversion rate-is rather high than in the last two decades. It was also reported that rainfall anomalies, tidal flooding occurrence before the 1990s, and water insufficiency for agriculture after 2000s are the factors of land use conversion in Tegal city which resulted by the major human impact on urban activities which had related to climate change. So that, the development and improvements method on meteorological and agricultural drought condition is still an interesting topic to discuss.

The Meteorology, Climatology, and Geophysics Agency in Indonesia or usually known as BMKG uses SPI (Standardized Precipitation Index) method in order to express the analyze the meteorological



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Stakeholders' perspectives towards effective climate change adaptation on the Mongolian livestock sector

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Abstract. Climate change is one of the greatest threats that world is facing today, and having significant deleterious effects on natural and human systems. Recent climate-induced extreme events and their impacts demand timely adaptation actions to the changing odds of their occurrence. The great phenomenon is already being felt in the Mongolian plateau, especially on the livestock sector. The sector provides the main income and livelihood for one-third of the population of about three million people. A high number of livestock is lost due to a unique phenomenon is known as a “dzud”. This paper examines the key stakeholders' perspectives in the implementation of climate change adaptation and identifies its barriers, with a focus on the livestock sector. In order to meet the objectives, this research used a semi-structured interview with organizations related to the livestock sector and climate change. The extent of stakeholders' perspectives might be depending on the way they share information, stakeholder engagement, and their experiences with extreme events, as well as their location and level in government. The research findings will indicate an understanding of climate change perspectives, adaptation, and level of capacity of organizations, which can be used as a guideline for organizations to develop climate change adaptation policies related to the livestock sector in Mongolia.

1. Introduction

The Earth's climate is changing in profound ways, while there has been growing debates on, that have addressed the risk and vulnerability of affected systems, and have issued Declarations that have been endorsed by most countries. Among the climate science community, there is a growing consensus that climate change is not just an unfortunate phenomenon, but indeed it is an anthropogenic tragedy by emitting greenhouse gas (GHG) into the atmosphere. Nevertheless, this trend is still not completely approved [1]. However, it is certain that the phenomenon has created uncertainty in, and a threat to, the future of sustainable development. The increasing number of extreme events has gained massive attention from a scientist, questioning how and what is the connection of those events to climate change. The following are several extreme events occurred over the past few years; 1) the 2013 typhoon Haiyan in Southeast Asia (especially in the Philippines), considered as one of the deadliest cyclones ever recorded [2], 2) the disastrous flooding in 2011 in Thailand [3], and countries bounding the Bay of Bengal is the most exposed to cyclones and flooding that have resulted in the loss of thousands of lives, displacement, damaged infrastructures and economic crisis, and 3) the 2008



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Improving Indonesian cinnamon (*c. burmannii* (Nees & t. nees) Blume) value chains for Greater Farmers Incomes

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Abstract. Genus *Cinnamomum* (*Lauraceae*) regroups some species whose stem bark are harvested, conditioned and traded as cinnamon in an international market. Over the centuries, the species have been domesticated so that now at least six different ones are grown in Southeast Asia countries. One of the species is *Cinnamomum burmannii*, also known as Korintje Cinnamon, which generates income for most smallholder farmers in Kerinci district, Jambi, Indonesia. Most cinnamon consumed in the world originates from this Korintje Cinnamon products. It is recognized for its unparalleled quality that comes with its sharp and sweet flavor, with a slightly bitter edge. However, international market requirements for product certification and quality standards make it difficult for a farmer to comply. Our research will address issues related to (improvement of) productivity, sustainability and value chains faced by cinnamon producers in Kerinci, to strengthen their product's value chains. Smallholder farmers are very vulnerable to climate change impacts, and thus empowering the value chains of agricultural products will increase farmers resilience to climate change. The research will analyze the development of agricultural value chains, certification & standards on trade mechanism to help farmers earn a better income and future prospects.

1. Introduction

Indonesia is a tropical country crossed by the equator. It has the second largest biodiversity and the third largest natural resource reserves for oil, natural gas, gold, copper and other minerals in the world. The country is also rich in various types of ecosystems: aquatic ecosystems, freshwater ecosystems, tropical rainforests, peat swamps, mangroves, coral reefs and coastal ecosystems. The highest biodiversity in Indonesia is to be found in the tropical forest environment. Not only serving as a source of commercial and industrial wood products, it also provides people's daily necessities, such as lumber, pulp, and paper. However, Indonesia is now facing multiple problems such as illegal logging, chaotic urbanization, unsustainable agriculture, and forest conversion (converting forests into large-scale plantations). As a result, Indonesia faces the great challenge of combining poverty alleviation and economic growth with sustainable use and conservation of biodiversity. For this reason, Indonesia needs to find solutions for the long-term sustainable use of biodiversity that will improve the social welfare of local communities.

Indonesia has several native natural products that have a potential value in local and global markets, such as *Cinnamomum burmannii* Nees ex Blume. This is one of the four types of cinnamon categorized as high economic value cinnamon besides *Cinnamomum verum*, *Cinnamomum cassia* (*C. aromaticum*, also called Chinese cinnamon), and *Cinnamomum loureiroi* (also known as Vietnamese or Saigon cinnamon) [1]. Genus *Cinnamomum* (*Lauraceae*) regroups some species whose stem bark



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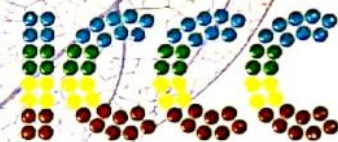
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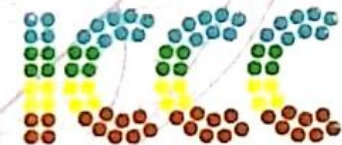
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A roadmap to effective urban climate change adaptation

by Rukuh Setiadi

Submission date: 22-Jun-2020 01:55PM (UTC+0700)

Submission ID: 1347904236

File name: C.10_A_Roadmap_To_Effective_Urban_Climate_Change_Adaptation.pdf (417.86K)

Word count: 3858

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A roadmap to effective urban climate change adaptation

To cite this article: R Setiadi 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **129** 012041

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A roadmap to effective urban climate change adaptation

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Abstract. This paper outlines a roadmap to effective urban climate change adaptation built from our practical understanding of the evidence and effects of climate change and the preparation of climate change adaptation strategies and plans. This roadmap aims to drive research in achieving fruitful knowledge and solution-based achievable recommendations in adapting to climate change in urban areas with effective and systematic manner. This paper underscores the importance of the interplay between local government initiatives and a national government for effective adaptation to climate change and takes into account the policy process and politics. This paper argues that effective urban climate change adaptation has a contribution to build urban resilience and helps the achievement of national government goals and targets in climate change adaptation.

1. Introduction

A framework is something larger than a theory that serves a particular function at least to describe a particular subject in a systematic manner and ideally to provide key elements that allow thorough analysis to the subject [1]. This indicates that a framework is required because there is complex and unstructured yet past and existing knowledge on the subject of interest. Climate change in general and climate change adaptation in specific may fall to this subject of interest. Hulme [2] states that climate change as ideas has traveled far away from its original root in the atmospheric study since the 1950s and it has crossed various disciplines, from economics to politics and from social to psychology.

The development of a framework will make it easier for a researcher, in particular, to position his or her research in such complex and massive jungle of climate change knowledge. It helps a scientist to shape his or her focus on this contested and rapidly changing terrain. A good framework may assist a group of researchers or scientists to communicate each other, through hopefully constructive debates on each key element of the framework – although sometimes it could end up with heightened unproductive one. However, the proposed framework in this paper is more an invitation to constructive debate and hopefully end up with a collaborative research program to improve or even modify the framework.

2. Literature Review

2.1. Why effective urban climate change adaptation

As indicated in the earlier sub-section, climate change adaptation science has developed rapidly. Climate change adaptation as a notion is substantially more diverse and complex than its definitions. Adaptation to climate change has different meaning depending on the framing. Fünfgeld and McEnvoy [3] and Preston et al [4] for example have shown this case and it shapes different adaptation practices in over the globe. Fussel [5] has successfully unpacked complex scope of climate change adaptation in several categorizations, such as in terms of types of adaptation (autonomous vs.

planned), agents (individual vs. collective), adaptation horizon (short vs. long-term), and etc. Although, an empirical survey on adaptation practices [6] shows that most of the adaptation is short-term oriented, small-scale, and follow business as usual rather than reduce the effect of climate uncertainty in the future.

Effective climate change adaptation is a phrase that may put all of these notions in the same basket. Effective climate change adaptation contradicts to 'mal-adaptation', adaptation practices that only increase human and natural systems at the same level or higher risk due to climate change and variation, in which Eriksen and Brown [7] and Eriksen et al [8] call as 'sustainable adaptation'. Effective climate change adaptation drives adaptation practices not only away from mal-adaptation but also achieve their additional goals harmoniously. Effective climate change adaptation has become one of the important themes in climate change research. It has become a focus of interest of many climate change researchers and scientists. A Google searching for phrase "effective climate change adaptation" offers more than 38,000 results, and with careful selection of scholarly sounds result in no less than 1200 documents, which address this phrase is found. Füssel [5] argues that the definitions of adaptation to climate change is not well developed and is open to various scopes and activities. However, the latest report of the fifth working group of the IPCC defines adaptation to climate change as 'the process of adjustment to actual or expected climate and its effects' [9].

Without a doubt, cities and urban areas play an important role not only in climate change mitigation but also in adaptation [10]; [11] because cities contribute to major global greenhouse emissions and are home for more than 60% of the global population today and 80% in 2050. Moreover, IPCC [9] also highlights the importance of cities in a single specific chapter of their latest report laying the foundations for strategies for effective urban climate change adaptation.

2.2. About the framework: some criteria

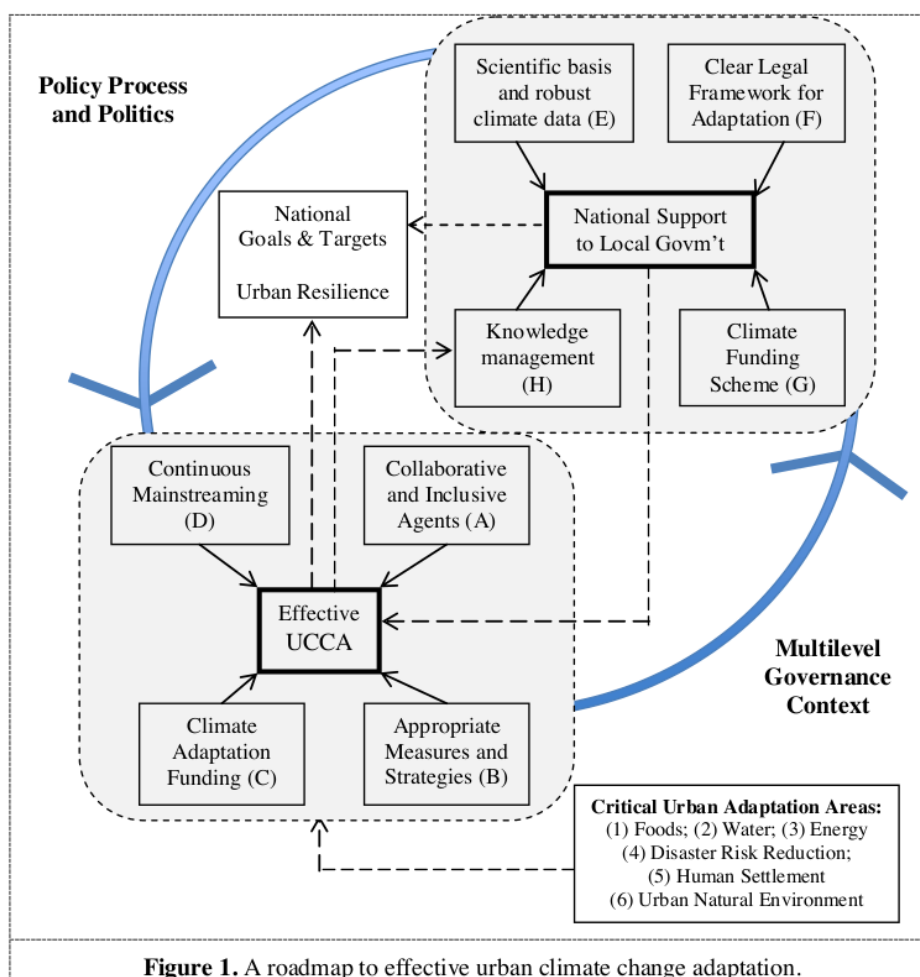
In addition to the literature review, this framework is built from author's practical experience in the preparation of action plans and urban climate change adaptation strategies and author's participation in a number of international collaborative programs. To begin with, this section will outline some criteria for the development of this framework.

There are a number of criteria in developing this proposed framework. First of all, this framework should be broad enough and flexible to cover multiple disciplines or subjects. It also capable to explain different dimensions, aspects or themes that are related to urban contexts such as human settlements, foods, energy, mobility, water, disasters (e.g. urban floods and drought), health, and etc. Secondly, the framework should cover various aspects that produce uncertainty in the future. At least, two crucial sources of uncertainty should be involved in the framework, namely: politics and policy-science relationships. Thirdly, the framework should consider various adaptation agents. It means that the framework provides space for analysis of adaptation initiatives delivered by governments, community groups, private sectors and other non-government actors or partnership between these actors including their adaptation performance. The performance of each actor may differ from one another following their organizational characteristics or institutional arrangements across the governance level. Fourthly, the framework should put attention to factors influencing the effectiveness of adaptation programs, projects or actions, such as mainstreaming, funding, cost-effective or affordable adaptation solutions, and etc. Finally, the framework should be able to link all these criteria for both explanatory and evaluative purposes, particularly to understand the ultimate goal of urban climate change adaptation. It is also essential to place the framework in broader and up-dated urban development discourses.

3. Discussion

A framework for research on effective urban climate change adaptation (Effective-UCCA) is illustrated in Figure 1. Besides the importance of local initiatives for effective adaptation to climate change, this research roadmap understands that adaptation to climate change also requires the support of the national government. Moreover, adaptation to climate change should also be framed in the

context of governance or multilevel governance. Multilevel governance is defined as a government that relies on more than one layer of government [12]. Multilevel governance is a model of governance that is inclusive; relying on either the role of government actors and non-governmental organizations [13]. Betsill and Bulkeley [14] categorize that the characteristics of multilevel governance in climate change has become one of the three important issues in the study of cities and climate change. There are two indications that reflect the existence of multilevel governance [15]. First, structures or institutions and actors or agents involved in the development of policy are increasingly more complex. Second, the success in addressing complex problems usually does not only involve a single institution or agency, but also institutions and agencies, which are at different levels of government. Multilevel governance is regarded as a model of governance that makes the management of climate change in cities becomes effective [16].



Therefore, cooperation among stakeholders that is inclusive and collaborative is extremely needed and becomes the first theme (A) in this roadmap. Some emerging research questions from this point of view are:

- A.1. How does collaborative climate change adaptation can achieve effective results? and in what ways?
- A.2. What are benefits generated from and challenges in implementing inclusive and collaborative climate change adaptation?
- A.3. What are effective strategies to encourage private sector participation in climate change adaptation?
- A.4. What sort of models for effective community participation in climate adaptation?

Effective adaptation to climate change is also determined by the management and appropriate adaptation strategies. There are various approaches to adaptation to climate change, which can be broadly divided into physical adaptations or infrastructural adaptation and non-physical adaptations that are more related to e.g. strengthening the capacity of the actors and the strengthening of community's social and economic access to adaptation [5]. Some studies also identified the use of technology for adaptation to climate change, particularly in the food and agriculture sectors. Other studies introduce ecosystem-based adaptation that is promoted by IUCN and a number of other scientists [17]; [18]. Among various adaptation activities, Biagini et al [6] evaluated that most of the adaptation actions are currently focused on social reinforcement and capacity building. Meanwhile, Satterthwaite and Dodman [19] state that physical adaptations are also required by developing and underdeveloped countries because at this time they actually have experienced 'infrastructure deficit'. Therefore climate change is creating new problems in responding to the deficit. Therefore, some research questions that arise from this second theme (B) are:

- B.1. What are efforts or strategies for urban change adaptation in urban areas? And is there any best approach to implement them?
- B.2. How do different approaches to climate change adaptation bring benefits to the city and its inhabitants?

Recent works of Setiadi and Nalau [20] for example addresses B2 question type by assessing whether urban regeneration through public vertical housing development is effective to improve urban health resilience and to deal with the changing climate.

Financing aspects of climate change adaptation become the third essential theme of this roadmap, given the absence of appropriate and adequate financing prevents adaptation actions and implementations. Some studies [21] underline the importance of and encourage the commitment to financing adaptation to climate change, particularly in developing countries. Without any adequate financial support, adaptation to climate change will likely be spontaneous, unplanned, relatively small in scale, and so the impact generated from them is also relatively limited. This pattern of adaptation does not much to change and to provide greater benefits to society. A number of important questions that need to be resolved on this theme (C) include:

- C.1. How much cost required to produce adequate adaptation actions? And what are economic benefits resulting from adaptation activities?
- C.2. How do climate change adaptation activities be implemented at low costs but provide effective results and greater impacts to society?
- C.3. How are the best way to integrate climate change adaptation activities and other activities that have economic or market values?

²⁵ Mainstreaming adaptation to climate change to be one of research themes that is not less important in climate change adaptation. Adaptation to climate change will not run effectively when climate change is not on the agenda of all development stakeholders. In this mainstreaming, supporting conditions are necessary and required. It is a unique process as it also involves timing and the availability of the key actors and local champions, and political alignments. The theories of the policy process are important to understanding this; they can explain why does climate change policy, including mainstreaming process work very well or does not work at all in the city government. A study conducted by Setiadi [22] for example describes the process of adaptation policies to climate change in urban areas by applying one policy theories known as the advocacy coalition framework

[23]. Yet, many other theories that can be used to explain the development of urban climate change policies, such as the institutional analysis and development, policy diffusion, and multiple streams. Back in the context of mainstreaming for effective adaptation to climate change (D), there are a number of fundamental questions such as:

- D.1. What are key drivers for effective mainstreaming of climate change adaptation? And how to establish that key driver at the municipal level?
- D.2. How to encourage adaptation to climate change at the municipal level?
- D.3. What are capacities required by local actors to get the highest effective mainstreaming of climate change?

This research and practical roadmap can be applied in the areas of climate change adaptation at the local level and in particular in urban areas. In other words, the question type A to D above can be tested to explain and evaluate critical areas of urban studies. These critical areas or fields include (1) food, (2) water, (3) energy, (4) disaster risk reduction, (5) settlements and the built environment, and (6) the urban natural environment.

As described in Figure 1, the support of the national government is another element that makes adaptation to climate change at the city level effective. The national government also needs the support of international community. The elements of central government support consist of four other sub-elements, namely: support to basic scientific and reliable climate data, a clear legal framework for climate actions and adaptation programs, adaptation financing schemes, and knowledge management. Associated with the support for the scientific basis and climate data, there are several underlying research questions (E), such as:

- E.1. What are key drivers, barriers, and challenges in providing scientific evidence and continuous climate data?
- E.2. What are roles played by scientific evidence in urban climate change policy development? Are they really matters?

Some recent works such as Morgan [24] and Tangney [25] has addressed E2 questions. While Morgan [24] examines the case of science-policy relationship in water resource management in Southeast Queensland, Tangney [25] compares complex relationships between climate change adaptation policy and evidence in UK and Australia. Additionally, Setiadi and Lo [26] also explore the role of policy research in local climate change policies in the Indonesian context.

Various existing regulations (ranging from legislation, presidential decree, ministerial regulation, to the local regulations) greatly affect the effectiveness of climate change adaptation. The regulation can encourage or inhibit climate change adaptation. It is associated with a pattern of local government culture, especially in Indonesia, which still puts themselves as the executor rather than as an innovator or creator of policy breakthroughs. These regulations sometimes are unclear and overlapping, which raises doubts and reluctance of local governments to run climate change adaptation programs. Some of the key questions on this theme (F) include:

- F.1. What are regulations that still unclear, potential to generate contradictions, and inhibit adaptation to climate change?
- F.2. What are breakthroughs that should be done to overcome this?

The availability of financing from national schemes has become one of the incentives to city governments to run programs for adaptation to climate change. In 2008 the Indonesian government through BAPPENAS, for example, established the Indonesia Climate Change Trust Fund (ICCTF). Despite attracting international funds to support climate change programs in developing countries, the establishment of the ICCTF represented an attempt to respond to demands for greater coordination and harmonization of climate change funding. Yet, most Indonesian local governments are unaware of the existence of and the funding opportunities provided by the ICCTF. The ICCTF has funded a limited number of climate change projects and all of them were proposed by and went to ministries and institutions at the national level [27], rather than government agencies or non-state actors at the provincial or city level.

- G.1. To what extent of climate change adaptation funding is available?

- G.2. What are roles played by such funding scheme that is publicly opened to climate change adaptation initiatives? and what are effects following this open adaptation funding on the ground?
- G.3. What are barriers and challenges faced by local governments and local community actors in accessing available funding sources?

Efforts in building and maintaining urban resilience to climate change are strongly influenced by the ability of cities to manage knowledge [28], sometimes referred to knowledge management. The knowledge that is built from local actions or practice is important and valuable to be properly managed. The knowledge that can be managed includes methods, solutions, experience, systems, etc. Additionally, providing the media in the form of a forum, or a platform to facilitate the transmission of knowledge so that they can be exchanged to the entire network of the city is also essential.

In essence, the learning process becomes a very important component to accumulate knowledge and experience, as well as to find out what works and does not, including the factors that influence them. The practices of adaptation to climate change that has proven successful in a city or a community need to be lifted and to be disseminated in the other cities and communities involved. Thus, urban climate change adaptation activities are not always departed from the beginning or zero. Under this theme, a number of fundamental research questions include:

- H.1. What are the extent and forms of support made by the national government in encouraging peer-learning among cities in climate change adaptation?
- H.2. What are roles played by the process of peer-learning between cities in the context of urban climate change adaptation?
- H.3. What is the most effective mechanism to improve peer-learning among city governments?

4. Conclusion

This paper has described the rationale, development criteria, and the element of urban climate change adaptation framework. The framework aims to organize various themes of research and then it is expected to result in a roadmap toward research programs and practical actions focusing on urban climate change adaptation. As this framework is at its infancy stage, the framework welcomes further constructive suggestion and means to invite further research collaboration in this field.

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