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Perception, Mitigation and Adaptation Strategies of Irrigated Paddy Farmer Community to Face Climate Change

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Abstract. Climate change has a real impact on the condition of agriculture in developing countries, including Indonesia. Irrigated paddy farmers are the ones really feeling the impact of climate change. Therefore, we need to understand the perceptions, mitigation and adaptation strategies of irrigated paddy farmer community to face climate change. The study is conducted in Indramayu and Tasikmalaya Regency in West Java by using descriptive survey method, regression analysis and path analysis through Structural Equation Modelling approach with Lisrel TM 8.5. The results showes that: (1) changes to climate variability affects the productivity of rice; (2) perception of irrigated paddy farmer community on climate change and its affects are influenced by internal and external factors; and (3) adaptation strategy are influenced by internal and external factors, whereas no mitigation strategy. Therefore, mitigation and adaptation strategies with site specific location are very necessary improving climate information services, increasing empowerment of farmers through field schools, and providing the provision of facilities that are practical and adaptive to climate.

Keywords: climate change, perception, mitigation strategies, adaptation strategies

Introduction

Rice is the staple food crops that strategically important in the context of food security. Production of rice which contribute greatly availability of food in Indonesia is obtained from irrigated paddy production systems. This production system is highly dependent on the availability of water, but some studies of IPFRI (2009) showed that at present there are water shortages those relating to climate change. Climate change has occured globally and its impact on agricultural regions and the coastal areas (Adger, 2001).

Climate change has led to changes in the average temperature of the atmosphere and precipitation patterns. In Asia, climate change was reported increased in temperature of 1oC-3oC and in Indonesia are moderate temperature rise of as much as 0.3oC. Climate change, climate variations and extreme events become more frequent seriously problem for human life (Cruz, 2007; IPCC, 2007). In Indonesia, climate change resulting dramatically increased of climate events such as floods and droughts (Policy Synthesis Team, 2008). These conditions are projected to lower the productivity of the rice plant and threatening rice production systems. Therefore, climate change must be anticipated, particularly in relation to water availability for irrigated paddy production.

Climate change does not only affect the productivity of irrigated rice production systems, but also works in reverse. Based on several studies, the agricultural sector has contributed to the total emissions of greenhouse gases (GHGs) in the atmosphere, such as CO2, CH4, N2O and other GHGs. The amount of greenhouse gases emitted into the atmosphere is influenced by the way of management of the land, water and nutrients. Conditions were flooded paddy soil, use of fertilizers, burning and decaying plant debris, will produce GHGs. These gases are able to absorb long-wave infrared radiation which is hot, so the GHG potentially can increase

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the temperature in the atmosphere. Thus, the influence of irrigated paddy production systems to climate change are also becoming increasingly important to be anticipated in the period ahead.

Farmers are in a diametrically potition, such as a community that felt the impact of climate change, due to its dependence on nature, as well as major stakeholders in the management of irrigated paddy. Climate change demands an intelligent farmers determine the appropriate planting time, choose the type of plants that fit, change cropping patterns and is also adaptable to any possibility of crop failure due to fluctuations in water and crop pests. Related to that, the necessary adaptation strategies to cope with the changes that occur and may occur (Deressa et al., 2009). Adaptation is a form of response adjustments made to cope with the impacts of climate change (UNISDR, 2010; UNDP, 2012). Therefore, the necessary understanding of the farming community about climate change and its impact on the agricultural conditions and the implementation of mitigation strategies / adaptation by farmers to face climate change.

West Java is one of the largest rice-producing provinces in Indonesia, but in the last five years of production was changes. In fact, West Java's rice production in 2014 only reached 11.5 million tons of milled rice or a decline of about 3.6 percent from 2013. Flooding and droughts are more extreme as the impact of climate change is identified as the main causes of the decline (CBS, 2014), Indramayu is located in the north and Tasikmalaya in the southern part of the main contributors of rice production in West Java. Department of Agriculture (2014) reported that the productivity of rice in Indramayu decreased by 10 tonnes / ha / year and Tasikmalaya 3 ton / ha / year in the last five years. One of the triggers is the climate anomalies that cause changes in climate variability and uncertainty that affect the availability of water for irrigation, cropping, pest attacks, flooding and drought. Additionally, Kab. Indramayu is also increasingly threatened by floods due to the tide (rob). According Boer (2008), if the sea surface temperature increases, the area of rice production centers are flooded northern coast will be more widespread, and is predicted to reduce rice productivity significantly. The threat of climate change are soil salinity and erosion (Haryani, 2014).

Associated with it and in anticipation of the above conditions, it is necessary to study the impact of climate change on rice production in these areas, farmers' perceptions of climate change and its impact on agricultural conditions, and how the strategy by the farmers to face of such phenomena. It is expected from this study to know what factors are an obstacle for farmers in the face of climate change. This study aims to: (1) analyze the relationship between climate variability and rice productivity in Kab. Indramayu and Kab.Tasikmalaya; (2) analyze the farming community perceptions about climate change and its impact on agricultural conditions; and (3) analyze the decisions of farmers in implementing mitigation and adaptation strategies to face climate change.

This article consists of four stages of assessment, namely: (1) analysis of the relationship between climate data and discharge of irrigation water and rice productivity; (2) identification of internal factors and external factors of farming communities; (3) analysis of the relationship between farmers' perceptions of climate change and its impact on agricultural conditions and climate data with internal and external factors that affect them; (4) analysis of the relationship between the strategies of mitigation / adaptation has been applied to farmers by internal and external factors that affect it.

Specific locations are selected based on two main criteria, namely: (1) be in a technical irrigation area, according to information the Central River Region; and (2) a technical irrigation area, which showed a level of extreme climate change, according to information from BMKG. Based on these criteria, the irrigation area (DI) are eligible to be used as a research location in Indramayu is DI Cipanas II with a total area of about 3,262 ha covering Kec. Kandanghaur, and in the district. Tasikmalaya is DI Cikayaraharja with area of about 100 ha which includes Kec. Pagerageung.

Geographically, it is located between 107°52' Indramayu district -108°36 'BT and 6°15'-6°40' LS, with an area of 204 011 ha, consisting of 119 643 ha of wetland and 84 386 ha of dry land. Based climate classification according to Schmidt-Ferguson, Kab.Indramayu including in temperate climates (type D) with an average rainfall of 1,591 mm and rainy days 81 days (Agriculture and Livestock, 2014). Climate variability contained in Indramayu influenced by its proximity to water bodies, namely the ocean.

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Ocean currents affect climate by heating or cooling the air mass that is in it, which then passes the mainland. This condition causes the evaporation of the oceans is greater than the mainland, so it is generally more humid coastal areas than inland areas (Campbell et al., 1999).

Geographically Tasikmalaya district is located between 17°8'-108°00 'BT, 07°10'-7°49' LS with an area of 2,846 km (284 646 ha.) That consists of 49 506 ha of paddy land area and 218 584 ha of dry land. Climate classification based Schmidt-Ferguson, Kab. Tasikmalaya has a wet climate types (type B). The average rainfall and rainy days in the district. Tasikmalaya 4,821 mm and 205 days (Department of Agriculture and Horticulture, 2014). Proximity to water bodies and the type of topography influence the climate variations locally and regionally. Kab. Tasikmalaya mountainous topography and land cover that affect climate locally high. The mountainous region has a significant effect on solar radiation, local temperatures and rainfall.

Methods

The primary data are obtained from interviews with respondents farmers and relevant agencies. This study uses a random sampling technique proportionally from the population of farmers who are in a DI selected. Total respondents from the DI are 45 farmer respondents. Total respondents from the two DI is a place of research is 90 farmers. Secondary data are obtained from the relevant agencies in the form of data on climate, irrigation water discharge (weir and channel), rice productivity within a certain time. Climate data and productivity of paddy are obtained from the district. Indramayu is obtained from weather stations that are in the Rice Research Institute and the Department of Agriculture and Animal Husbandry, while irrigation water discharge data obtained from the Department of Water Resources Management or the Central River Region. Climate data in the district. Tasikmalaya is obtained from climate stations in Wiriadinata Air Field, rice productivity data obtained from the Department of Food Crops and Horticulture, while the water discharge data obtained from the Department of Water Resources Management.

Variable data obtained and operationalized in this study are analyzed by using appropriate statistical approach to address the identification problem. Primary data is tested for reliability and validity, while the secondary data quality is tested using normality test. Variable relationship to climate variability and rice productivity include changes in temperature, rainfall and rainy days, the water discharge irrigation (dams and channels), and the productivity of rice. To determine the pattern of development trend of climate variability, irrigation water discharge, and productivity of rice at a certain time to do the analysis of the description, whereas to determine the relationship between climate factors, the discharge of water irrigation and rice productivity regression analysis using SPSS 16 software.

Identification of internal factors (including the characteristics of farmers, farm characteristics, farming performance and the level of farmers 'participation in the activities of social organizations) and external factors (including the existence of farmers, farmers' access to resources and facilities climate information services, as well as socio-cultural conditions). Both of these factors are analyzed descriptively and used to analyze the perceptions and strategies for mitigation / adaptation applied irrigated rice farming community. Analysis of internal and external factors are performed using the Excel 2007. Aspects studied cover the farmers' perceptions of climate change and its impact on farming conditions, good perception traditionally formed (based on experience and local knowledge) as well as modern (based on knowledge and technology climate forecasts), To know the perception of the farming community the study do descriptive analysis, while to analyze the factors that affect the perception of farmers is made by using path analysis (path analysis) with software Lisrel 8.5.

Mitigation strategies are applied to farmers in the face of climate change (either applied by the creativity and initiative of farmers and communities that initiated or introduced from outside the community) and farmer adaptation strategies in the face of climate change (both adaptation applied rationally-traditional and adaptation rasional-modern). To determine the mitigation and adaptation strategies that are applied by farmers, the study does the descriptive analysis based on the level of mitigation strategies and adaptation strategies adopted by farmers. To analyze the factors that affect farmers' decision is implementing mitigation strategies / adaptation the study performes path analysis (path analysis) by

first transforming the input data into a ratio scale. Approach path analysis using Structural Equation Modelling (SEM) analysis tool LisrelTM 8.5 software.

Farmers Characteristics

Farmers, both in the district. Indramayu and Kab. Tasikmalaya have relatively different characteristics, especially in terms of age, formal education, business orientation, level of participation in the organization, land ownership, rice farming culture, farming experience, scale of operations and so on. Rice farmers in the district. Tasikmalaya is relatively younger, educated, experienced kuarang oriented, semi-commercial, small scale, cropping pattern of rice-rice-crops, land surface sloping ramps up and so (Table 1). Based on the age and experience of farming, most farmers can feel the climate change in the last ten years and the impact on the environment, crops, land and agricultural activities in general.

Relationship Between Climate Variability and Rice Productivity in Tasikmalaya Regency

Analysis of climate data in the district. Tasikmalaya over a period of eleven years indicates that there has been a change in climate variability. Temperatures tend to decrease, especially in the dry months (R2 = -0.427), rainfall tends to decrease, especially in the wet (R2 = -0.473), and the rainy days also tend to decrease, especially in the dry season (R2 = -0.660). The results of the analysis of the irrigation water discharge over a period of eleven years also shows that the water discharge weir and channel changes every year. Water discharge weir tend to decrease, especially in the wet (R2 = -0.250) and the water discharge channel in the dry months (R2 = -0.112). However, the water discharge channel tends to increase especially in the wet (R2 = 0.042).

The analysis showed that the

Table 1
Identification of Farmers Characteristics in Kandanghaur District (Indramayu Regency) and Pagerageung District (Tasikmalaya)

Farmers Characteristics in Indramayu Regency	Farmers Characteristics in Tasikmalaya Regency
55.6% were productive	60.0% were productive
47.8% of primary school graduates	66.7% of primary school graduates
35.6% had a load of 4 people	53.3% had a load of 3 people
31.1% experienced 21-30 years farming	44.4% of 11-20 years experience farming
45.7% income of less than 1 million per season	35.6% income of less than 1 million per season
43.5% total income of 1-2 million	31.1% total income of 1-2 million
53.3% oriented commercial farming	66.7% oriented commercial farming half
28.6% actively participate in social organizations	42.9% actively participate in social organizations
57.8% manage land area of 0.5-1 ha	73.3% manage land area of less than 0.25
44.4% produces 21-40 tonnes of paddy	73.3% yielding rice 1-10 kw
53.3% apply the cropping pattern of rice-rice-fallow	80.0% implementing a rice-rice-crops
42.2% easy access to the irrigation network	68.9% easy access to irrigation ditches
62.2% freehold land	97.8% freehold land
97,8% type of flat surface	71.1% surface type ramps
46.5% stated no sources of climate information	53.0% stated no sources of climate information
45.3% access to resources difficult climate	49.4% access to resources difficult climate
66.3% in the access to remote information services	67.0% in the access to remote information services
51.8% do not have the information and communication media	49.8% do not have the information and communication media
63.8% applying indigenous rice cultivation	33.3% applying indigenous rice cultivation

Source: Primary Data Processed, 2014

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temperature (x1), rainfall (x2) and a rainy day (x3) affect the water discharge weir by 52.3% (y = -5026.67 + 205,53x1-0,33x2 + 16,05x3) but when analyzed partially the climatic factors that affect the flow of water weir is temperature and rainy days. Climate variability also affects the water discharge channel is 76.4% (y = -973.995 + 54,436x1 + 0,107x2 + 3,735x3), but when it is analyzed partially, the most influential climatic factors is a rainy day. Improved water discharge channel in the wet is not only associated with climate change, but also influenced by the way the management of irrigation systems, especially at the level of the channels managed by the P3A. P3A very important role in improving the effectiveness and efficiency of water use, especially in the dry, so as to meet the water needs of agriculture.

The results of data analysis productivity of rice for nine years in the Tasikmalaya district shows that rice production in the district. Tasikmalaya tends to increase (R2 = 0.843). Changes in temperature (x1), rainfall (x2) and a rainy day (x3) affect the productivity of rice amounted to 76.8% (y = 292,701-9,48x1 + 0,01x2-0,60x3). While the influence of water discharge weir (x1) and channel (x2) on the productivity of rice amounted to 83.6% (y = 112.0 + 0,01x1-0,14x2).

Farmers Perceptions on Climate Change and Its Impact on Agricultural Conditions in Kandanghaur District of Indramayu Regency

Most of the farmers of respondents states that the climate has changed over the last ten years (54.4%). Of the ten indicators of climate change asked to farmers, they mostly have the same perception, especially to temperature changes, arrival time or the end of the rainy season and the dry season, the dryness, the length of the dry season and the rate of evaporation, while rainfall and rainy days or the length of the rainy season has not changed. Farmers felt the impact of climate change on agricultural conditions, but only a small proportion of farmers who expressed a very real impact (29.8%). Most of the farmers of respondents sometimes feel the effects of climate change (56.7%), but all of them have the potential to have the same perception that climate change has an impact on farm conditions. The impact of climate change that is often experienced by farmers is widespread areas of drought, rising costs of farming, and the conquest of water.

Impacts are sometimes experienced by farmers is increasing the intensity and widespread area flooding, increase in pests, increased weed growth, increased pest attack, diminished effectiveness of the supply of irrigation water, changing the time of planting, changing cropping patterns, changes in processing techniques of land, changing planting technique, and reduced productivity of rice plants. The impact of climate change are not felt by farmers is changing the flow of irrigation water. This condition is the same as previous studies stating that climate change has led to an increase in the intensity of droughts, floods and increased pests, diseases and weeds, reduced supply and increased irrigation farming costs (Foley, 1993; Boer, 2008; Pasandaran, 2008).

Farmers Perceptions on Climate Change and Its Impact on Agricultural Conditions in Pagerageung District of Tasikmalaya Regency

Most respondents farmers in the district. Pagerageung Kab. Tasikmalaya feel the change in climate (47.8%). Of the ten indicators of climate change to farmers asked the respondents, the majority of farmers of respondents feel the change in temperature and precipitation. There is an increasing drought and the long dry season, and the increased rate of evaporation or evapotranspiration process. According to farmers the respondents, the temperature in the district. Tasikmalaya has increased which led to increased evapotranspiration process and increased drought. Farmers statement is different from the climate data show that there has been a drop in temperature. While rainfall and rainy days tend to decrease in the dry months led to the availability of water is reduced and resulted in drought.

Perception of farmers in the district. Pagerageung Kab. Tasikmalaya on the impact of climate change on agricultural conditions is quite high and farmers stating that agricultural conditions have changed is 48.3%. Of the fifteen indicators of climate change impacts are asked to farmers respondent, the impact of climate change is predominantly felt by farmers is widespread areas of drought, increasing the types and increased weed growth, reduced the effectiveness of the supply of irrigation water, changing the time of planting, processing techniques of land and planting technique, rising costs and declining productivity of rice farming. Impact indicators sometimes felt by farmers is changing the discharge of irrigation water, while the indicator of the impact that never felt by farmers are increasing the intensity

of flooding, widespread flooding areas, the increase of pests, spread of the pest attack, changing cropping patterns and the occurrence of seizure or water conflicts.

Factors That Influence Perception of Farmers on Climate Change Condition and Its Impact on Agriculture

Farmers' perceptions of climate change is influenced by external factors. Based on the analysis (Table 2 and Table 3), the perception of farmers on climate change is strongly influenced by social and cultural conditions. In general, agricultural activities farmers in Java is still influenced by social and cultural conditions (Adimiharja, 1993; Kasryno et al., 2003). Agricultural activities are mainly rice farming is already known to the farmers in Java since the seventeenth century. Their knowledge of rice cultivation and then passed down to the next generation. Until now, farmers still cultivate rice by the same method.

Perceptions about the impact of climate change on agricultural conditions are influenced by internal and external factors. Based on the analysis, the factors that affect farmers' perceptions of the impact of climate change on the condition of agriculture is the characteristics and performance of the farm, where the source of climate information, access to sources of climate information and facility information services, as well as the social and cultural conditions, as presented in Table 2 and Table 3. When compared to the influence of one factor with other factors, the socio-cultural conditions have an important role in the formation of farmers' perceptions of the impact of climate change on agricultural conditions. Therefore, to understand farmers' perceptions of the impact of climate change, it is necessary to understand also social and cultural conditions of local peasant communities that differ from one location to another. Community perception of irrigated rice farmers about climate change and its impact on the condition of agriculture will then affect mitigation strategies / adaptation applied to farmers in an effort to anticipate the impacts of climate change.

Table 3
Factors Affecting Farmers Perespsi About Climate Change Impacts on Agriculture Conditions in Indramayu and Tasikmalaya regency

Notation	Internal and External Factors That Affect Perception of Farmers On Climate Change Impacts on Agriculture Condition (Y1-b)		Significance Value
X1	Farmers Characteristic	Internal Factors	0,07
X2	Level of Farmer Participation on Social Organization		0,16
X3	Ownership Information and Communication Media		0,02
X4	Characteristic and Performance of Farming		-0,40
X5	Existence of Climat Information Sources	External Factors	-0,47
X6	Access to Climate Information Sources		0,33
X7	Access to Information Services Facilities		0,45
X8	Condition of Farmer Socio Cultural		-1,76

Table 2
Factors Influencing Perceptions Farmers On Climate Change Impacts in Indramayu and Tasikmalaya regency

Notation	Internal and External Factors That Affect toward Perception of Farmers on Climate Change (Y1-a)		Significance Value
X1	Farmers Characteristic	Internal Factor	-0,01
X2	Level of Farmer Participation on Social Organization		0,12
X3	Ownership Information and Communication Media		0,18
X4	Characteristic and Performance of Farming		-0,12
X5	Existence of Climat Information Sources	External Factor	-0,23
X6	Access to Climate Information Sources		0,11
X7	Access to Information Services Facilities		-0,20
X8	Condition of Farmer Socio Cultural		-1,08

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Mitigation Strategy Implementation/ Adaptation By Farmers in Kandanghaur District of Indramayu Regency

Most farmers (45.2%) in the district. Kandanghaur Kab. Indramayu not implement mitigation strategies. Of the nine options strategies proposed to farmers to respondents, only a small percentage of farmers applying mitigation strategies and partly also potentially apply. Farmers applied mitigation strategy is to reduce or minimize the use of water through the application of water-saving farming techniques. Mitigation strategies that are never implemented by the farmers is soil and water conservation techniques (greening), planting shade trees, using PTT and SRI method of planting. Based on the study Budiastuti (2008), the conventional method could potentially generate GHG greater than PTT and SRI. However, these methods are considered technically difficult and physically (the availability of tools and materials) by the majority of farmers, so the technique is not used (Setiawan, 2009). PTT and SRI method has been shown to reduce GHG emissions so that the method is incorporated as an effort to mitigate climate change.

Some farmers of respondents (41%) in Kec.Kandanghaur Kab. Indramayu is already implementing a number of adaptation strategies. Some were farmers of respondents (24.3%) have the potential to implement adaptation strategies. Of the twenty-three selection strategies that can be applied by farmers, only ten strategies that have been implemented. Adaptation strategies that are accelerating the time of planting, especially before the dry season, replacing varieties are short-lived, conserve water usage especially dry season, improving irrigation networks that water supply awake, turn on knowledge and local technologies including the use of institutions of prey, the use of manure, pest and disease control local and so on, apply a water system using pumps especially before or during the dry season, replacing commodity crops, mobilize all members of the family in farming, leave land fallow, and do planting in unison.

Adaptation strategies applied to farmers associated with climatic conditions that have undergone changes / irregularities season, so that farmers are difficult to predict the time comes / the end of the dry season / rainy, so farmers changing planting time (speed up planting time), using varieties of early maturing, minimizing the use of water, repairing irrigation channels, using a pump, simultaneously planting rice, planting crops, member land, all of which are associated with water availability. To implement these strategies, farmers need substantial costs, especially labor costs, so as to anticipate the use of labor from the family (wife and children).

Mitigation Strategy Implementation/ Adaptation by Farmers in Pagerageung District of Tasikmalaya Regency

Some farmers of respondents (48.4%) have implemented mitigation strategies, and some have the potential to implement the strategy (8.2%). Of the nine selection of mitigation strategies proposed to farmers to respondents, four of which have been adopted by the majority of farmers of respondents, namely the minimization of water use, not to burn straw, applying the method of PTT and implement water-saving cultivation techniques. Farmers respondents did not change planting techniques (direct seeding), changing the system of land management (by applying the system of Sports Without Land / TOT), reforestation, tree mananam shade and apply the SRI method, since the method is difficult to do technically by farmers.

In general, adaptation strategies are applied farmer respondents in the face of climate change impacts in DI Cikayaraharja more diverse than in DI Cipanas II. Of the twenty-three choice of adaptation strategies, most farmers already applies (50%). Partially, adaptation strategies dominant implemented by the farmers is to save irrigation water use by adjusting the distribution of water between users in the upstream, midstream and downstream, to plant simultaneously, enable P3A in network maintenance and distribution of irrigation water in Cikayaraharja, accelerating the time of planting, save the use of production facilities, applying the cropping system, develop livestock business, changing the type of plants, changing cropping patterns, looking for a job other than farming.

Factors Affecting Farmers Decision In Implementing Mitigation Strategies/ Adaptation

The results of the analysis (Table 4 and Table 5) shows that the decisions of farmers, both in the district. Indramayu and Kab. Tasikmalaya, in applying mitigation strategies

are not influenced by internal and external factors. Mitigation strategy is the adoption of research results. This strategy requires special skills and abilities and not at any time be made by farmers, both technically and socio-cultural, so that farmers are not or do not implement them. In fact, when viewed in terms of the economy, then the mitigation strategies more profitable because it does not cost money, and technically simpler. However, socio-cultural, farmers are not used to doing things that are new for the low adoption rate of innovation (in terms of old age and low education). Therefore, the necessary role of the perpetrators of interest such as the departments / department of agriculture in collaboration with other relevant agencies, the universities, NGOs and other government components in socializing mitigation strategy is to achieve a sustainable agricultural environment conditions and environmentally sound.

Based on the analysis, the factors that influence the decisions of farmers in implementing adaptation strategies are the characteristics of farmers, the level of farmer participation in the activities of social organizations, the characteristics and performance of the farm, where the source of climate information, access to sources of climate information, access to service facilities climate information, and farmers' perceptions of climate change and its impact on farming conditions (Table 4 and Table 5). This condition is the same as the results of research Gbetibouo (2009) at the Border River Limpopo South Africa indicating that the size of the household, farming experience, access to water, land rights (land title), off-farm activities and access to education is a major factor affect farmers' adaptation strategies in the face of climate change. Important aspects of adaptation and mitigation strategies that have not been analyzed and perceived is the interaction of actors (Saut Sagala et al., 2013) to mitigate the effects of climate change.

Conclusions

Based on the objectives, results and discussion, it can be concluded as follows: (1) changes to climate variability in Indramayu has affected the productivity of rice compared to the discharge of irrigation water in

Table 4
Factors Affecting Farmers Decision in Applying Mitigation Strategies in Indramayu and Tasikmalaya Regency

Notation	Internal and External Factors That Affect toward Farmers Decision in Applying Mitigation Strategy (Y2)		Significance Value
X1	Farmers Characteristic	Internal Factors	-0,27
X2	Level of Farmer Participation on Social Organization		-0,06
X3	Ownership Information and Communication Media		-0,06
X4	Characteristic and Performance of Farming		-0,24
X5	Existence of Climat Information Sources	External Factors	0,11
X6	Access to Climate Information Sources		-0,06
X7	Access to Information Services Facilities		-0,17
Y1	Farmers Perception		-0,1

Table 5
Factors Affecting Farmers Decision on Implementing Adaptation Strategies in Indramayu and Tasikmalaya regency

Notation	Internal and External Factors That Affect toward Farmers Decision in Applying Mitigation Strategy (Y2)		Significance Value
X1	Farmers Characteristic	Internal Factors	0,82
X2	Level of Farmer Participation on Social Organization		0,36
X3	Ownership Information and Communication Media		-0,15
X4	Characteristic and Performance of Farming		-0,45
X5	Existence of Climat Information Sources	External Factors	0,53
X6	Access to Climate Information Sources		-2,32
X7	Access to Information Services Facilities		2,62
X8	Farmers Perception		0,31

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Tasikmalaya District, however not only it is climate change that affect the productivity of rice, but also discharge water for irrigation; (2) social and cultural conditions greatly affect farmers' perceptions of climate change, while the farmer's perception of its impact on the agricultural conditions is influenced by the characteristics and performance of the farm, where the climate and access to resources, access to information and service facilities socio-cultural conditions; and (3) the implementation of mitigation strategies by farmers are not influenced by internal and external factors, while the implementation of adaptation strategies are influenced by the characteristics of farmers, the participation rate, characteristics and performance of the farm, where the climate and access to resources, access to facilities and information services farmers' perceptions. Based on the conclusion, it is suggested that in order to anticipate the impact of climate change, the necessary adjustments mitigation strategies / adaptation of specific locations, are to increase the role of the information services of climate especially agricultural extension, to increase in participation (empowerment) farmers in anticipation of climate change through the field school, as well as to repair facilities existing and provision of climate measurement tool that can be used by farmers.

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