The Conservation of Government Pasture Land and the Economic Efficiency of Pasture Law in Turkey

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浅見　淳之　「トルコにおける国有牧草地保全のための草地法の経済効率」

遊牧民国家であったトルコでは、牧草地は畜産を支える貴重な資源である。牧草地は国有地であり、コモンズとして利用されている。ところが1950年代から過放牧と、農業地または工業地、宅地などへの過剰な転用によって、破壊されその面積は急速に縮小してきてしまった。最も深刻に影響を及ぼしたのが、トラクタリゼーションによって開墾が容易になったことで農民が不法に進めてしまった国有牧草地の敵対的占有行動である。この不法行為は、土地登記法の不完備という法制度上の問題によって促進されてしまった。牧草地の破壊に対してトルコ政府は、法制度上の不完備性を改めるために1998年に「草地法」を立法させた。新法のもとに国有牧草地と私有農地の境界が再設定され、敵対的占有となされた農地は国有牧草地に強制収用されることになった。そこで、敵対的占有農民（被告）と政府（原告）が裁判を起こした場合、双方が受け入れられるパレート最適が効率的な司法判断とされる点から、草地法の効率性を検討した。その結果、損害賠償よりも強制収用のほうが効率的であることが示され、同法の効率性を支持することになった。パレート最適な上では、社会的な効用が最大となる点が司法判断とされるので、ナッシュ交渉解を判決とした。この解のパラメータ変動効果を見ることで、草地法の経済学的な属性を検討した。すなわち、牧草地の価値が世論において再評価されている現状では強制収用が進むが、気象変動などによって農家の所得が下がる場合には農家が敵対的占有地にしがみつき収用が進まなくなること、罰則金の加重化は農民の反抗を生みかえって収用が進まなくなること、裁判費用の加重は農民にとって負担になるので裁判をしないで強制収用に応じる可能性が高まることが明らかになった。

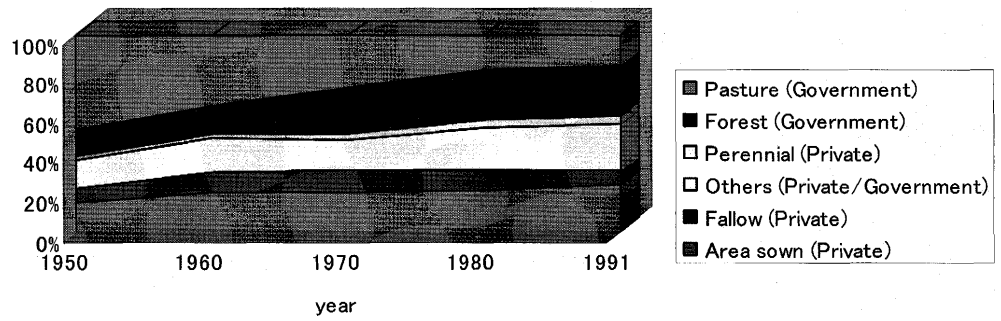
1　Destruction of Government Pasture

Government pasture which covers about 100% of total pasture in Turkey has been fundamental resource to graze animals for more than one hundred years. Before 1950, almost 50% of the country was covered by government pasture, so that there was abundant size of pasture resource that could satisfy the demand of animal products of those days. However, the size of government pasture has decreased sharply and the number of animals has increased since 1950. The former was caused by the conversion of government pasture to crop land which could satisfy more demand of cereals ,and the latter was caused by augment of the demand of animal products, with growth of population. This contradiction has drawn the destruction of government pasture, which embraces two serious problems, that is the excessive conversion of government pasture and the overgrazing.

1) Excessive Conversion of Government Pasture to Other Use

It is necessary to convert government pasture to other use in order to meet the population growth. In fact, the large amount of government pasture has been converted under the direction

Figure 1 Change of Land Use in Turkey



of the government. The problem is the degree of conversion progression. The appropriate conversion that keeps government pasture satisfying the demand of animal products will be acceptable. But, under the current circumstance that the demand of animal products increase rapidly, the excessive conversion of government pasture makes matters worse.

In fact, there has been fast decrease of government pasture and fast increases of agricultural land and other uses since 1950 as shown in Figure 1[1]. The fast decrease of government pasture is connected with the excessive conversion of it. If the government pasture had been converted under the strict management of government, the pasture could have been converted appropriately. In actual fact, however, vast size of the pasture has been converted by farmers for the use of their private cropland without any permission of the government. This unlawful conversion defined as the intrusion, that is called as 'pasture attack (mera fecavozj), has caused the excessive conversion.

2) Overgrazing

The contradiction between decrease of government pasture and increase of number of animals brought about overgrazing. Overgrazing has caused grass quality of the government pasture worse. According to the results of shepherds interviewed in Konya province, the plant cover ratio of total government pasture was 75% before 1980, but now this ratio has reduced to only 25%. Especially about 20% in the botanical composition of the government pasture are thorny (dikenli of), and animals can not eat them at all. Good grasses on the government pasture is not enough to sustain animals as many as before. This serious deterioration of the government pasture started since about 1980. The speed of decline in the size of the good quality grass pasture increased during the last two decades.

2 Factors in Causing Destruction of Government Pasture

1) Causing Factors of Excessive Conversion of Pasture

The excessive conversion of pasture is caused by the improper institutional arrangements of

land management. Especially the inefficient execution of the land registry law is the main causing factor. First we will state the land registry system in Turkey and then illustrate the problems of the system that has brought about the excessive conversion.

1-1) Land Registry System in Turkey

All lands in Turkey are currently required to be registered as either private ownership or government ownership based on cadastral survey according to the land registry law (law no. 2644). Private ownership of land is indemnified by the title deed which is called 'tapu'. Before 1922, that is Ottoman Turkse empire days, land ownership was not clearly defined. Some parts were possessed by sultans, some were traditionally cultivated by peasants, and vast uncultivated land were used freely as common pasture by pastoralists. At the founding time of the state in 1923, huge uncultivated common pasture was taken by government. Thereafter, because of population growth and immigration, there has been strong social need to convert vast uncultivated government pasture to privately cultivated land. Government authorized the farmer who had reclaimed a certain area of cropland from the government pasture by himself and hold on to the area for long enough years such as 20 years to take possession of the area. Both the continuously cultivated land and the newly reclaimed land were obliged to be registered with 'tapu' according to the current land registry law of Turkey. But, in fact, issuing 'tapu' was very difficult work.

1-2) Transaction Cost and Inefficient Execution of the Land Registry Law

The cadastral office is in charge of issuing 'tapu' and indemnifying the legal ownership of the land in question to the owner under the control of director of state cadastral bureau. Land with 'tapu' must be demarcated strictly by the 'tapu' officials who actually came to check the ownership. But quite lots of expense are inevitable for the demarcation, because the cadastral officials should come to each plot, get the exact evidences of the ownership to the plot in question, and measure the plot. There are seldom formal written evidences for the plot in question, so that it is often very difficult to prove the ownership of the plot by the person who claims to own the plot.

These expenses for demarcation and registration of land are the transaction costs. The reason of difficulties in issuing 'tapu' is that the transaction costs of establishing private ownership of land are too high. Due to high transaction cost, the current land registry law is not executed efficiently. Only 70% of whole land of Turkey has been registered with 'tapu' until now. The other 30% of land is still unregistered with 'tapu'. A number of farmers who possess land without 'tapu' were interviewed in our field surveys in Adana and Konya province during the last few years. The unregistered land is called as customary land (zilyet). Holders of the customary land have faced such severe problems as difficulties in disposal by sale, in inheritance, and in mortgaging during the past few decades.

1-3) Pasture Attack and Excessive Conversion of Government Pasture

The difficulty of lawful demarcation is linked to the facility of unlawful border transgression. It is very difficult for the government to monitor and restrict each unjust farmer who appropriates the government pasture unlawfully, because of the extremely high transaction cost to do so.

Therefore, the government pasture has been attacked under the current land registry law as fallows.

Government pasture has been always allowed to be used only for common grazing. But it is said that unjust farmers had started to attack pastures or to intrude government pastures in 1950-60's. That was the time when farmers were able to expand their cultivated land more easily by technological improvement such as switch from animal draft to tractor draft. This unlawful intrusion started to decrease since 1980's, because deterioration of the government pasture became too severe. However, 30~40% of the total government pasture was already unlawfully converted to private crop land in Turkey by then. Many cases of pasture attack found in field survey of Konya and Adana province give evidences to high transaction cost for preventing intrusions[2]. Unlawful pasture attack resulted in the excessive conversion and fast decrease of the government pasture.

2) Causing Factors of Overgrazing

The overgrazing is considered to be caused by (1) tragedy of commons, and (2) excessive conversion of government pasture.

The first factor is what we call tragedy of commons[3]. The government pastures are being allocated among animal-grazing villages in Turkey. In other words, there is the village common pasture that belongs to government property, that is to say village government pasture, in every animal-raising village. The village government pasture is the village common pool resource that any member of village can have accesses to nonexclusively. As the demand of animal products increased, individual member of village were motivated to add more number of animals to herds on the village government pasture. The overgrazing is caused by the fact that size of the government pasture is limited compared with the increasing population of animals. Each individuals try to use as much grass as possible to increase his income directly. Animals added nonexclusively to the total herds by him and others deteriorates the grasses on the village government pasture. Every individuals are suffered from the deterioration of pasture relatively less than the gain from additional animals, so that they will continue to add animals to graze over the total optimum number of animals on the pasture. Each individual does not stop continuing to add animals, because his activities are not rewarded individually to him, but only externalized to the other users. Ultimately the grass on the village government pasture will be destroyed.

Second, the excessive conversion of the government pasture has also induced overgrazing problems. Decrease in size of the government pasture makes shepherds face the problem of grass shortage. Thus they could not help to start bringing their animals to the government pasture much earlier than the optimum season. They had to start grazing their animals just after snow melt (around 15 Feb). But this date is too early for the grass to grow appropriately. Once growing points of grass has been eaten by the animals, grass loses the power to grow well. This early grazing also deteriorates the quantity and quality of grass.

The overgrazing based on tragedy of commons and excessive conversion of pasture has caused severe degradation of government pasture. In addition, decrease of precipitation of last two decades has accelerated the speed of degradation. According to the results of the village elders interviews in Konya province, the speed of degradation of the government pasture

increased along with the decrease of rainfall on pasture for the last two decades. There must be the strong causality between the government pasture degradation and the precipitation decrease.

3 Enactment of the Pasture Law

The excessive conversion based on pasture attack and the overgrazing of the government pasture have severely decreased both quantity and quality of grass on it during the past four decades. These problems were caused by inefficient institutional arrangements under the current land registry law system. The government introduced new institutional arrangements in order to restore and conserve the government pasture with the enactment of pasture law (law no.4342) in February 1998. Under the new arrangements the following objectives were sought.

(1) To delineate the border between private cropland and the government pasture.
(2) To confiscate the intruded government pasture area.
(3) To implement the project for improving grass quality on pasture. Subsidized fertilizer and grass seeds are often provided to shepherds and farmers.
(4) To assign use right of demarcated government pasture to the authority of village community.

(1), (2) are executed as follows. Extension service workers and cadastral officials are jointly in charge of attaining these objectives. First, the boundary stones are placed on the border between the government pasture and private crop land based on the cadastral map (kadastral pafta). The farmers who admit the stoned border must voluntarily limit their crop land up to the stoned one. But in many cases farmers object the stoned border and continue to occupy the intruded area. Therefore, second, the heads of villages are obliged to investigate the intrusion according to the stoned border. If he finds it, he must report to the extension workers regarding location of the doubtful area. Third, a survey map (tecavus krokisi) of the doubtful area is drawn by an actual survey. Fourth, in the case where the fact of intrusion is proved, the intruder are warned by the government. Unless he will returned the intruded area to the government in 4years from the warning, he is supposed to be sentenced 2-3 months' imprisonment. Though the law was enacted, however, still only a small portion of the illegally intruded area of the government pasture has been delineated or confiscated (see table 1).

(3) and (4) are performed such as the following two cases. One case is Karakislakci village of Adana Province. The village government pasture consists of 500da summer pasture (Yayla) and 1,000da hilly pasture (1da = 0.1ha). Those pastures belong to the government land, but the use right is assigned to the village according to the pasture law. The pastures are divided into some plots and only one plot is permitted to be used for grazing in one season. If a plot is used in this season, the plot is forbidden to be used in a few years. This system is what we call the rotational grazing for sustainability of pasture. Because administration of the village is remitted to the board of village which consists of the head and 4 elected staffs, the usage of the village government pasture was also decided by the committee. The committee forces shepherds to use the pasture based on the Rotational grazing. Another case is Dagdibi village of

Table 1 Execution of Pasture Law (2002)

Province	Confiscatior (ha)		Delineation (ha)		Province	Confiscatior (ha)		Delineation (ha)	
	Done	Targeted	Done	Targeted		Done	Targeted	Done	Targeted
ADANA	0%	5,640	32%	33,851	KONYA	1%	379,357	3%	314,563
ADIYAMAN		0		0	KUTAHYA	0%	12,850	1%	11,948
AFYON		0	0%	695	MALATYA	18%	48,620	34%	161,111
AGRI	0%	2,553	74%	13,106	MANISA	30%	3,130	6%	14,897
AMASYA		0		0	K..MARAS	1%	145,318	26%	172,814
ANKARA	0%	12,736	0%	26,665	MARDIN	0%	12,965	13%	18,264
ANTALYA	0%	4,635	0%	1,389	MUGLA	0%	1,388	39%	7,035
ARTVIN	100%	16,144	100%	3,868	MUS	2%	59,794	24%	74,301
AYDIN	0%	9,471	0%	18,911	NEVSEHIR	16%	21,576	3%	168,735
BALIKESIR	0%	52,976	0%	47,761	NIGDE	0%	27,757	10%	24,122
BILECIK	11%	1,528	11%	1,535	ORDU	100%	32,382	100%	45,443
BINGOL		0		0	RIZE	98%	4,788	97%	40,730
BITLIS	0%	14,073	0%	51,949	SAKARYA		0		0
BOLU	0%	2,856	0%	8,960	SAMSUN	0%	8,382	0%	103
BURDUR	0%	6,977	0%	7,726	SIIRT		0	5%	637,787
BURSA	0%	12,885	11%	14,979	SINOP		0	0%	2,270
CANAKKAL	38%	4,737	15%	19,920	SIVAS	7%	40,403	100%	20,768
CANKIRI	0%	31,326	0%	67,947	TEKIRDAG	0%	32,996	0%	33,541
CORUM	0%	13,941	0%	30,359	TOKAT	5%	23,807	0%	3,749
DENIZLI	0%	4,263	0%	6,645	TRABZON	76%	2,460	95%	37,839
DIYARBAK	0%	36,798		0	TUNCELI	0%	15,429	0%	5,569
EDIRNE	0%	55,100	0%	5,382	S.URFA		0		0
ELAZIG	0%	20,612	0%	20,612	USAK	0%	48,466	100%	2,246
ERZINCAN	0%	31,320	100%	2,816	VAN	67%	185,792	61%	412,936
ERZURUM	24%	31,274	0%	144,438	YOZGAT	0%	71,052	1%	116,015
ESKISEHIR	0%	62,582	0%	49,688	ZONGULDA	2%	142	43%	870
GAZIANTE	0%	12,128	0%	44,232	AKSARAY	0%	1,470	0%	144,884
GIRESUN	100%	247	63%	47,560	BAYBURT	0%	19,096	0%	20,106
GUMUSHA	60%	48,677	73%	59,264	KARAMAN	0%	51,127	0%	62,233
HAKKARI		0	100%	830	KIRIKKALE	0%	3,836	0%	8,950
HATAY	0%	3,896	0%	8,258	BATMAN	0%	13,310	2%	10,134
ISPARTA	0%	14,277	0%	13,955	SIRNAK	0%	13,089	0%	13,205
ICEL	100%	162	52%	58,179	BARTIN	0%	239	6%	1,854
ISTANBUL	0%	3,297	0%	1,644	ARDAHAN	0%	13,298	0%	16,465
IZMIR	0%	26,538	0%	12,366	IGDIR	59%	3,832	47%	8,290
KARS	0%	16,561	1%	32,786	YALOVA	0%	844	0%	791
KASTAMO	9%	5,597	31%	1,584	KARABUK	6%	889	55%	1,662
KAYSERI	9%	39,430	22%	84,148	KILIS	0%	6,698	0%	11,993
KIRKLARE	0%	1,815	4%	30,411	OSMANIYE	2%	2,381	2%	2,381
KIRSEHIR	0%	45,508	0%	14,149	DUZCE	0%	1,899	0%	1,889
KOCAELI	0%	226	0%	714	TURKEY	13%	1,963,643	20%	3,621,773

Source: Turkish Government Documents

Adana Province. The village government pasture of 5,000~6,000da is also controlled under rotational grazing for grass sustainability. In addition, according to the government project based on World Bank's fund, fertilizers were spread on the pasture in last year and grass seeds are planed to be spread on the pasture in this year. According to the interviews of the village head, increase of grass yield can be recognized distinctly in this summer. But this project of pasture rehabilitation is just the special case. The projects and assignment of use right of government pasture to village, that is (3) and (4), are related to coping with overgrazing, but the concrete

cases of (3) and (4) are still very few. On the contrary, places of border stone and confiscation, that is (1) and (2), which can cope well with excessive conversion based on pasture attack, are currently mainly being executed. We will henceforth focus on the pasture attack related issues of (1) and (2).

4 Issues of Confiscation under the Pasture Law

The pasture law is enacted in order to solve the pasture attack problems caused by inefficient institutional arrangements under the current land registry law. If so, is the pasture law intrinsically the efficient one to conserve and restore the government pasture? We need to examine the efficiency of institutional arrangement of the pasture law.

We consider that the special institutional aspect of the pasture law is the confiscation that government dispossess the attacked pasture compulsorily. It is because the confiscation is contrary to the interest of pasture attacker, so that it makes the institutional arrangement more difficult and more inefficient. We establish the following 3 issues that are linked to the confiscation and examine theoretically them in following sections.

(1) Choice between confiscation and reparation

There are two ways for coping with the unlawful intrusion. One is confiscation and another is reparation by the intruder. The trouble of adversely possessed land is often resolved by reparation instead of confiscation, when confiscation costs monetarily and time-consumingly more than reparation. We need to examine whether the government's confiscation is more efficient than reparation.

(2) Cost and benefit of confiscation

Transaction cost such as place of border stones, actual survey, judicial procedure, or exercise of police power must be also bore when the confiscation is executed. The benefit from restoration of government pasture can be gotten instead. We must investigate whether benefit covers cost efficiently on the case of confiscation.

(3) The factors that affect the execution of confiscation

Even though Turkish government started to try to confiscate the intruded area, only a small portion of intruded government pasture has been restored. In fact, the confiscation can not be executed perfectly. We must investigate the factors that affect the execution of confiscation.

5 Theoretical Framework for Analysis of the Pasture Law

The raison d'etre of law is assessed by both equity and efficiency. If judicial judgment were one sided, principle of equity would be collapsed and social order would break down. If judicial judgment caused waste resource, principle of efficiency would be collapsed and society could not be sustainable. These are the reasons why the importance of equity and efficiency is emphasized. Equity is the domain that hitherto jurisprudence mainly dealt with. But efficiency is the domain that jurisprudence does not dealt deeply in but economics is strong in. The judicial

judgment based on the law must be equal to the most efficient agreement that is socially acceptable after exhaustive negotiations among privies. The most efficient agreement is driven from the courthouse's arbitration that the one maximizes his utility subject to the constraint that the other has already maximized his utility. This concept of the most efficient agreement is equal to Pareto optimality that is also sought in Economics. This is the reason why there are spheres that economics can take an active part in jurisprudence. Interdisciplinary studies between jurisprudence and economics has been often applied to analysis of law in the last decade, which is called as Economics and Law[4].

The above mentioned issues of confiscation can be investigated with the simple model that is originated by the author based on economics and law. There are two encountered parties, namely the pasture attacker who has intruded unlawfully the government pasture and the government who tries to confiscate the intruded area. The confiscation brings about the conflict between them. Basically the attacker is to blame, because he intruded the state demesne. But the fault is partly laid to the government's charge, for the government's inefficient institutional arrangement has caused the pasture attack. If an attacker has occupied the area of government pasture for long enough years, he must be allowed to acquire the area in problem by prescription. The problem is the case that the attacker claims his ownership without any evidences. In the case, both sides claim the ownership and are brought into conflict. The conflict should be mediated under the third party that is independent from both parties. The typical third party is the courthouse. Actually there are so many cases that farmer institutes a suit against government about ownership of his occupied crop land in question. If we could collect adequate number of the precedents for pasture confiscation suits, we could provide strong evidence to our theoretical analysis. But, because of difficulties of collecting official judicial documents in Turkey, first we focus on theoretical studies in this paper.

We can investigate the efficiency of confiscation by assuming that the conflict is resolved based on the judicial judgment. Let $p(0 \leqq p \leqq 1)$ be the attacker's probability assessment of winning a suit. Let $q(0 \leqq q \leqq 1)$ be the government's probability assessment of winning a suit.

Different attacker has different p and different government officer in charge has different q. Let P be the attacker's total probability assessment of winning a suit that is representative of all attackers' assessments. Let Q be the government's total probability assessment of wining a suit that is representative of all officers' assessments. The judicial judgment arbitrates the conflict based on Pareto optimality, because it is the only one agreement that can be concluded between two parties in the most efficient institutional arrangement. The courthouse ought to judge the agreement in the way that P is equal to $1\text{-}Q$ and Q is equal to $1\text{-}P$ on the basis of Pareto optimality. Pareto optimality is realized on the point that the attackers maximizes their total expected value based on P subject to the constraint that the government officers have already maximized their total expected value based on Q. Suppose the judicial judgment is $P^*(=1\text{-}Q^*)$ and $Q^*(=1\text{-}P^*)$. All attackers and government officers are obliged to agree on the point of the courthouse's P^* and $1\text{-}P^*$, (that is Q^* and $1\text{-}Q^*$).

6 Efficiency of Confiscation under the Pasture Law

First, issues of (1) choice between confiscation and reparation and (2) cost and benefit of confiscation will be examined in this section. Now suppose that the value of the intruded area for the pasture attacker is V which creates return of harvests. On the judicial judgment, P^* becomes equal to $1\text{-}Q^*$ and Q^* becomes equal to $1\text{-}P^*$ in order to conclude agreement between the attacker's party and the government's party. In that case, P^* represents $1\text{-}Q^*$, so that Q^* is not needed to be referred. Transaction cost TC such as judicial cost is required in order to conclude the agreement. Basically the party who lose a suit must bear the transaction cost.

6-1) Confiscation or reparation

If government gives up the idea of confiscation and makes attacker pay indemnity in compensation for occupation of intruded area, the agreement between two parties can also be reached by reparation rule. There are actually a few such cases in Turkey. Let the indemnity be X. The total expected value of the attacker and the government under reparation rule is respectively therefore,

A (Attacker) : $E(A) = PV + (1\text{-}P)(V\text{-}X) - (1\text{-}P)TC$ (1)

G (Government) : $E(G) = (1\text{-}Q) * 0 + QX - (1\text{-}Q)TC$ (2)

On the judicial judgment, (1) and (2) become

A (Attacker) : $E^*(A) = P^* V + (1\text{-}P^*)(V\text{-}X) - (1\text{-}P^*)TC$ (3)

G (Government) : $E^*(G) = P^* * 0 + (1\text{-}P^*) X - P^*TC$ (4)

The social welfare that fulfills the condition of Pareto optimality is summation of expression (3) and (4). That is

$$E^*(A) + E^*(G) = V - TC \quad (5)$$

(5) is the frontier line on which both parties can agree under the judicial arbitration, regardless of $P^*(or\ Q^*)$ and X. If the social welfare is positive, that is $V > TC$, the agreement of both parties can be concluded under the reparation rules, irrespective of the courthouse judgment P^* and indemnity X. This is called as Coase Theorem[5]. The reparation rule could be efficient under only this condition.

But the reparation is exceptional instance and there is no case interviewed in our field surveys in Adana and Konya province. Government pasture is prohibited strictly by the government from being used as crop land. The government will accept the reparation rules only in the case that the attacker uses the intruded area as pasture. But it is impossible to make the attacker use it as pasture, because pasture is of no value for him. So far as both parties will not make a compromise with each other, the transaction cost under reparation is prohibitive, that is $V < TC$.

Therefore, the reparation rule is concluded to be inefficient institutional arrangement, so that the other confiscation rule must be adopted by the government.

6-2) Cost and Benefit of Confiscation

The confiscation is now tried to be executed by police power under the pasture law. If attacker does not return the intruded area to the government, the area is compelled to be confiscated and the attacker is supposed to be amerced in the sum of M in which negative value of imprisonment is included. But he may be allowed to acquire the occupied area of government pasture by prescription, in the case of long years occupation. The conflict between both parties is caused by the case that the attacker claims his ownership without any evidences.

Let P be the attacker's total probability assessment of wining a suit that the intruded area can be held out on by the attacker. Let Q be the government's total probability assessment of winning a suit that the intruded area can be retrieved by the government. In the case that the area can be confiscated, the attacker can gain nothing but penalty. Suppose that government is given M intact and that both parties evaluate the area at V. Transaction cost TC such as judicial cost must be bore by the party who lose a suit.

The total expected value of the attacker and the government under confiscation rule is respectively therefore,

$$\text{A (Attacker)} \quad : E(A) = PV + (1-P)(-M) - (1-P)TC \tag{6}$$

$$\text{G (Government)} \quad : E(G) = (1-Q) * 0 + Q(V+M) - (1-Q)TC \tag{7}$$

On the judicial judgment, (6) and (7) become

$$\text{A (Attacker)} \quad : E^*(A) = P^* V + (1-P^*)(-M) - (1-P^*)TC \tag{8}$$

$$\text{G (Government)} \quad : E^*(G) = P^* * 0 + (1-P^*)(V+M) - P^*TC \tag{9}$$

The social welfare that fulfills the condition of Pareto optimality is summation of expression (8) and (9). That is

$$E^*(A) + E^*(G) = V - TC \tag{10}$$

(10) is also the frontier line on which both parties can agree under the judicial arbitration, regardless of P^*(or Q^*) and M. If the social welfare is positive, that is $V > TC$, the agreement of both parties can be concluded under the confiscation rules, irrespective of the courthouse judgment P^* and amercement M. This is also understood as Coase Theorem. As the frontier of land has been vanishing and the size of unreclaimed land has been decreasing, the value of government pasture has been increasing. So far as the benefit of the retrieved government pasture area is expected to be higher than the transaction cost necessary for confiscating processes, the confiscation rule is concluded to be the efficient institutional arrangement. Judging by the interview of local government in Konya province, we can say Turkish government has decided to execute the new pasture law progressively.

7 Social Agreement on Confiscation under the Pasture Law

Finally, issues of (3), namely the factors that affect execution of confiscation will be examined in this section.

Under the confiscation rule, both attacker and government can agree on the frontier line, that is to say expression (10) regardless of P^*, because Pareto optimality is fulfilled. Next thing of judicial judgment to do is decision of social agreement P^{**} that both parties accept. P^{**} stands for the degree of the confiscation that actually can be executed. The courthouse gives the ruling in the way that the attacker win a suit in $P^{**} * 100$ %. As P^{**} is larger, the judgment case favorable to the attacker is more. As P^{**} is smaller, the judgment case favorable to the government is more.

According to Nash-bargained solution, the attacker and the government jointly choose the social agreement P^{**} to maximize the product of their expected value $E^*(A)$ and $E^*(G)$, subject to their Pareto optimality. The product is a kind of acceptable social utility. That is

$$\begin{aligned} &\text{Max} \quad E^*(A) * E^*(G) \\ &= \text{Max} \ (P^* V + (1-P^*)(-M) - (1-P^*)TC) * (P^* * 0 + (1-P^*)(V+M) - P^*TC) \qquad (11) \\ &\quad \text{subject to} \quad E^*(A) + E^*(G) = V - TC \qquad (12) \end{aligned}$$

The necessary condition of this social agreement P^{**} is

$$P^{**} = (V+2M+TC) / 2(V+M+TC) \qquad (13)$$

The courthouse arbitrates both parties according to this P^{**} and the attacker is obliged to return the intruded area in the possibility of $P^{**} * 100$ %. This Model is illustrated graphically in figure 2. The point of tangency G realizes the largest acceptable social utility under Pareto optimality.

There are three factors that interact to affect the degree of confiscation execution P^{**}, that is the evaluation of the intruded area V, amercement M, and transaction cost such as judicial cost TC. In order to investigate the influence of V, M, and TC on P^{**}, provided the other factors remain unchanged, P^{**} is differentiated by each variable as follows.

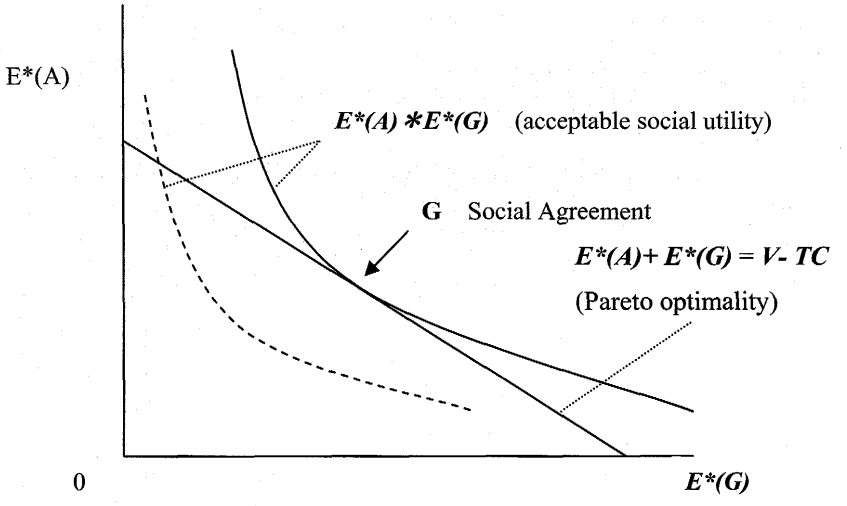
$$dP^{**}/dV = -2M / (2V+2M+2TC)^2 < 0 \qquad (14)$$

$$dP^{**}/dTC = -2M / (2V+2M+2TC)^2 < 0 \qquad (15)$$

$$dP^{**}/dM = (2V+2TC) / (2V+2M+2TC)^2 > 0 \qquad (16)$$

These are concluded as following. First, the degree of confiscation execution P^{**} is proportional to the incremental land value of the intruded area V. The higher the intruded area is evaluated, the more progressively the confiscation will be executed. At the present, the frontier of land has been vanishing and both the government and the public has started to revaluate the government pasture. In fact, the Turkish government is going forward the confiscation and the

Figure 2 Social Agreement on Confiscation Execution



attackers cannot help fulfilling the pasture law policy.

Second, on the contrast, the lower the intruded area is evaluated, the more difficultly the confiscation will be executed. If the deterioration of climate condition such as less precipitation reduces the marginal productivity of the intruded area, it will result in decreasing the evaluation of the area and reducing the attacker's agricultural income. The attacker will strongly insist on continuing to occupy the area in problem in order to keep his total agricultural farm income level. Decrease of precipitation affects the confiscation execution negatively.

Third, the degree of confiscation execution P^{**} is inversely proportional to the incremental amercement M. It is futile to fine the attacker heavily in order to promote the confiscation, because the attacker resists the avaricious government policy and is not willing to compromise easily. Heavy punishment can not reduce cases of lawless act.

Forth, the more transaction cost TC the attacker incurs, the more progressively the confiscation will be executed. Compared with the case of government, it is more burdensome for individual attacker to bear the transaction cost such as judicial cost. The attacker may favorite to fulfill the government order rather than suffering from the complicated formalities in courthouse.

8 Concluding Remark

The government pasture has been drastically destroyed since 1950, due to the excessive conversion of the pasture to other use and the overgrazing. The most serious factor in causing fast destruction of the government pasture is the unlawful intrusion, that is what we call pasture attack. Pasture attack was the results of inefficient institutional arrangement under the land registry law, so that Turkish government newly enacted the pasture law in 1998 in order to resolve the institutional inefficiency. According to the pasture law, the intruded area of the government pasture is now tried to be confiscated by the government.

We theoretically examined the efficiency of the new pasture law in this paper. Judging from the present situation that both Turkish government and the public reevaluates the value of government pasture, the confiscation rule is considered to be intrinsically efficient device rather than any other rules at the present. However, on the case that the crop productivity of the intruded area is decreased by some reasons such as climate change, the confiscation will be executed more difficultly. It is because the attacker will insist on continuing to occupy the area in problem in order to keep his income level.

NOTES

[1] On the contrast, the government forest has been conserved carefully under rigorous application of the law of forest (law no.6838). 99% of forest belongs to state treasury and lumbering is completely controlled by the government. The border of forest is being firmly fenced against intrusion.

[2] We introduce two typical cases of pasture attack. One is the case of Kilicli village in Adana province. There is hilly area where trees grow sparsely and animals are grazed on the underbrush of there in the village. 'Tapu' officials came to this village in 1960's and agricultural land was registered with 'tapu' at that time. But, compared with the size of hilly area at that time, it has reduced strongly without notice. The size that used to be 4,000da (1da=0.1ha) 20 years ago has reduced to 2,000~3,000da by pasture attack until now.

Another case is Buyukbrnak village in Konya province. In this village many farmers attacked the government pasture unlawfully, even though they know the fact of intrusion. The agricultural land is 22,000da in area. The area of pasture is 21,026.00509da which is divided among 31plots. 397.733da of whom used to be intruded and 200da was returned to the government. In other words, 2% of pasture was intruded and 1% of pasture are still unlawfully occupied by unjust farmers.

[3] According to the original sentences by G.Hardin, tragedy of commons is described as fallowing.

Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit —in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. (Hardin(1968), The Tragedy of Commons, *Science* 162, p1244)

[4] See Miceli,T.(1997), *Economics of the Law : Torts, Contracts, Property, Litigation,* Oxford.

[5] The Coase theorem is defined in Miceli,T.(1997) , p9 as following.

The Coase theorem says that if transaction costs are low enough to permit bargaining between the parties to an externality, and if property rights are well defined, then the initial assignment of rights will not affect the ultimate allocation of resources, which will be efficient.

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