THE PRICE OF COVIABILITY : POLLINATION AT ALL COSTS.
LEGAL APPROACH TO THE NEW RELATIONSHIP BETWEEN MAN AND POLLINATORS

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In memory of Jacques Weber,
A tireless communicator.
To our fruitful exchange of views
Interrupted all too soon

Abstract

Over the centuries, man has been closely dependent on pollinators, whilst barely noticing them. It has taken their decline under man's influence for us to better understand their benefits and envisage what their disappearance could cost us. It is in economic terms that the issue has been addressed by the Millennium Ecosystem Assessment, as it was addressed by the FAO: they have highlighted the importance of "pollination services" and at the same time raised the problem of the payment of such services and the cost of maintaining them. In this case, the service is considered in mutualistic terms, the environmental service that man provides for pollinators, in order to ensure the eco-systemic service of certain pollinators for man. This necessary association with the "labor" of pollinators, once again calls into question the relationships between man and insects and obliges us to develop new legal instruments in order to manage them and ensure the production of these services. These means are mostly conventional: pollination agreements consequently allow bees to be assigned to the pollination of orchards and other crops in exchange for a service remuneration. However, these agreements question the legitimacy of payment, just as they question ownership of the service by the beekeepers seeking payment for the service provided by their bees, vital for plant production, while this service remains uncertain and difficult to control. Moreover, a price is omitted from these contracts: the price which is "borne" by the pollinators made available, undermined by transhumance, not to mention the potential risks to biodiversity. "Protection" agreements complement "exploitation" agreements in order to ensure a coexistence between the human occupation of soils and pollinators, in the form of "floral fallow" or "late mowing", or even "biodiversity" agreements, for the purpose of compensating the crop losses linked to the lack of or reduction in pesticide treatments on plants during the pollination period in order to avoid killing bees. The man-pollinator co-existence consequently organized must not be misleading however: it betrays the fact that the economy is firmly appropriating nature, an ownership which obliges us to place a value on a function which until now, has always been free of charge. It does however permit us to find a pretext to protect it.

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Pollinators are part of the history of humanity: bees and honey are mentioned in the oldest writings ever discovered, from Sumer to Babylon, passing by the Hittite laws which penalized the theft of beehives. We also find their traces in the hieroglyphs of Ancient Egypt (Harissis and Harissis, 2009; Pundyk, 2010). There are numerous myths and legends that, on all continents and in all eras, have been dedicated to these relations (Ransome, 1937). However, for a long time, honey and beeswax remained the only noticeable and visible benefits of beekeeping or of the search for so-called "wild" honey. The role of insects in pollination was not perceived at all, what was invisible was left to chance, dependent on the wind. As Pliny the Elder stated, summarizing the majority of ancient treaties on agriculture and breeding: *"The following is the order which Nature observes throughout the year. First comes fertilization, taking place when the west wind begins to blow, which is generally from February the 8th. This wind impregnates the creatures that derive life from the earth-indeed in Spain even the mares, as we have stated : this is the generating breath of the universe, its name Favonius being derived, as some have supposed, from fovere, 'to foster.'. It blows from due west and marks the beginning of spring. Country people call it the cubbing season, as Nature is longing to receive the seeds ; and when she brings life to all the seeds sown, they conceive in a varying number of days and each according to its nature, some immediately, as is the case with animals, while some do so more slowly and carry their progeny for a longer period of gestation, and the process is consequently called 'germination.'" (Pliny).*
The auxiliary role of insects was only understood much later: in fact, it wasn't until the Age of Enlightenment in Europe that the principle of sexual reproduction for the majority of plants was confirmed, bringing with it the possibility of the fundamental "insect-plant" relationship and laying the foundations for the entomophilous reproduction of angiosperm plants (Abrol, 2011). Darwin then marked a decisive stage with his observations on the reproduction of orchids, speculating on the existence of an interdependence related to successive "plant-insect" adaptations (or "coevolution"): *« (…) I have further shown that even Lepidoptera are able to penetrate other and tougher tissues. It is an interesting case of co-adaptation that in all the British species, in which the nectary does not contain free nectar, the viscid matter of the disc of the pollinium requires a minute or two in order to set hard ; and it would be an advantage to the plant if insects were delayed thus long in obtaining the nectar by having to puncture the nectary at several points."* (Darwin, 1862).

These observations will fundamentally change the view of pollinators and modify the empirical relationships traditionally established until then. The transhumance of beehives intended to improve honey production(Lemeunier, 2006; Fanica 2006), the only objective sought at the time, was gradually replaced by a more functional approach: to improve plant production (fruits, vegetables, plants). The domestic bee *(Apis mellifera)* became the precious auxiliary of the plants' fruit production whilst the displacement of beehives became a financial investment. This new idea reflected the economic appropriation of a natural function: domestic pollinators had already been the focus of economic transactions, but on a more modest family or local scale, . Such transactions had now taken on an industrial scale. This also permitted a better perception of the "pollination crisis" characterized by the collapse of pollinator colonies *(Colony Collapse Disorder)* under the influence of various factors: depending on the regions of the world, beekeepers record losses of between 30 and 70% of their bee populations, without counting attacks on non-domestic pollinators, on which we have little data but for which the harmful effects are real[1] : substitutions of species, regression of the associated flora

[1] "*Wild pollinators have declined in occurrence and diversity (and abundance for certain species) at local and regional scales in North West Europe and North America. Although a lack of wild pollinator data (species identity, distribution and abundance) for Latin America, Africa, Asia and Oceania preclude any general statement on their regional status, local declines have been recorded. Long-term international or national monitoring of both*

… etc (Chagnon, 2008; European Food Safety Authority, 2013; United States Department of Agriculture, 2013; Deguines et al., 2014). This awareness of *Colony Collapse Disorder* and the risks for biodiversity served to justify an institutional intervention in order to preserve the eco-systemic service provided by pollinators, and in particular by domestic bees.

The massive decline in pollinators was taken into account within the framework of the United Nations Convention on Biological Diversity (1992), during the third Conference of the Parties in 1996: The *Conservation and sustainable use of agricultural biological diversity* (COP 3 – decision III/11) consequently noted, concerning the "*Impact of Biological Diversity on Agriculture"*, that : *"a large proportion of crops depend on insect pollinators for good yields"*. It prioritizes them within the context of "Initial issues for conducting case studies": *"1. Pollinators, including consideration of the monitoring of the loss of pollinators worldwide; the identification of the specific causes of pollinator decline; the estimation of the economic cost associated with reduced pollination of crops; the identification and promotion of best practices and technologies for more sustainable agriculture; and the identification and encouragement of the adoption of conservation practices to maintain pollinators or to promote their re-establishment".* Following *The Sao Paulo Declaration on Pollinators* (1999), the Fifth Conference of the Parties of the Convention on Biological Diversity promoted an "*International Initiative for the Conservation and Sustainable Use of Pollinators"*[2] based on the fact that "*native pollinators need to be protected and sustainably managed for the pollination service they can provide and that agricultural practices be designed to incorporate the protection and sustainable management of bee populations.* "*The pollinator crisis exemplifies the intimate relationship existing between the welfare of natural environments and their biodiversity and the needs of sustainable agriculture"*. The aim of this is to promote coordinated action worldwide to: *"(a) Monitor pollinator decline, its causes and its impact on pollination services ; (b) Address the lack of taxonomic information on pollinators ; (c) Assess the economic value of pollination and the economic impact of the decline of pollination services ; (d) Promote the conservation and the restoration and sustainable use of pollinator diversity in agriculture and related ecosystems"*. It asks the FAO *"to facilitate and coordinate the Initiative in close cooperation with other relevant organizations and to consider establishing a coordination mechanism, with geographical balance and with leading relevant organizations, to prepare a proposal for a plan of action taking into account the recommendations in the Sao Paulo Declaration on Pollinators, as well as on contributions submitted by countries and relevant organizations, for submission to and review by the Subsidiary Body on Scientific, Technical and Technological Advice and consideration by the Conference of the Parties at its sixth meeting"* (COP5, decision V/5). This plan was adopted by the Sixth Conference of the Parties in April 2002 (decision VI/5) and is based on the networking of five regional initiatives, coordinated by the FAO: in addition to the Brazilian initiative for South America[3], the African Pollinator Initiative (1999), established to promote pollination as a vital service for the survival of human populations and the conservation of biodiversity in Africa (FAO, 2007); the European Pollinator Initiative (2004), which aims "to integrate and co-ordinate local, national and international activities relating to pollination into a cohesive network in order to safeguard the services provided by pollinators across the continent"[4]; the North American Pollinator Initiative (Committee on the Status of Pollinators in North America, 2007)[5],which aims to "raise public

pollinators and pollination is urgently required to provide information on status and trends for most species and most parts of the world"(IPBES 2016).

[2] Known under the name of IPI (*International Pollinator Initiative*) (decision V/5, section II). http://www.internationalpollinatorsinitiative.org

[3] http://www.webbee.org.br/bpi/english/linha_tempo.htm

[4] www.europeanpollinatorinitiative.org

[5] http://pollinator.org/nappc/index.html (NAPPC : *North American Pollinator Protection Campaign)*.

awareness and education and promote constructive dialog about pollinators' importance to agriculture, ecosystem health, and food supplies", to "promote conservation, protection, and restoration of pollinator habitat" and to "document and support scientific, economic, and policy research - creating the first international data bank (library) of pollinator information"; the Oceanic Pollinator Initiative (2008)[6], for which "Pollination is an essential ecosystem service, and a prerequisite to all the other essential services provided by plants, yet in Australia, New Guinea and on the Oceanic Islands". The aim is to develop information *"about the distribution and ecology of pollinators, taxonomy of insect pollinators, whether or not they are in decline, the ecosystem service role of native and introduced pollinators, the economic value of pollination services by unmanaged pollinators*. These regional actions are reinforced by the FAO's Global Action on Pollination Services for Sustainable Agriculture (2010) : it's a full-sized project, working together with partners from seven countries : Brazil, Ghana, India, Kenya, Pakistan, Nepal and South Africa (2009-2014). The development objective of the project is *"improved food security, nutrition and livelihoods based on better conservation and sustainable use of pollinators".* (UNEP, 2010).

These services have been the focus of monetary appraisals. According to a study conducted on one hundred or so plants used for human consumption, they would reach an approximate value of $153 billion euros, or 9.5% of the agricultural production value used for global human food in 2005 (Gallai and Co., 2009). This estimation is based on a negative value, the "shortfall" due to the absence of pollination and the costs to replace the failed service. We are now better aware of the importance of pollinators and of what their disappearance could cost: a multitude of reports and books assess the services they provide (*Ruhl and co., 2007; Government of Ireland, 2008)* or more generally, propose an analysis of these services *(Braat and Brink, 2008).* As noted by the TEEB, *"The reason for this characterization is that the value of these services often remains invisible until it is no longer provided by 'ecosystems and biodiversity'.* (The Economics of Ecosystems and Biodiversity, 2014). However, is the service really free, "offered by nature", as we have considered it to be until now? Its scarcity reveals the hidden costs, and consequently, its economic value in the absence of having appreciated it until now for its environmental contributions. The "environmental good" it has become has the value of its contribution to procurement and support services : it can consequently be measured economically (Chevassus-au-Louis, 2009; Deffairi, 2015) from multiple points of view, whether in terms of promoting the labor of bees, as understood in French law(I), or remunerating the eco-systemic service provided through pollination agreements (II), or funding the eco-systemic pollination service (III) or the environmental pollinator protection service (IV).

I. - THE VALUATION OF THE WORK OF BEES IN FRENCH LAW

Bees visiting flowers has traditionally been valued in terms of honey and beeswax, sometimes resulting in agreements between hive owners and a third party, most often paid in kind. Such agreements characterize an ownership relationship based on the immobilization of the bee colony within a hive: the "hive-bees" consubstantiality consequently creates a close dependence on the beekeeper. This "servitude" on the part of bees transforms them into production animals, within a renewed perspective, from the time that the pollination service takes precedence over honey production. It raises the question of the legitimacy of beekeepers' rights with respect to the work of bees and leads us to ask whether it would not be possible to identify a common and collective right regarding this particular function of bees, in the form of a '*transpropriation'*.

[6] http://www.oceanicpollinators.org/

1. The contractual valuation of the work of bees

The contractual valuation of the work of bees is long-standing. From the 14th century, historians noted the existence of livestock leases concerning swarms of bees (Fournial, 1976), ancestors of the current livestock lease agreement in the Civil Code. A simple livestock lease *"is a contract by which one person gives to another animals to be kept, fed, and cared for, on condition that the leasee will profit from one half of the increase in stock and will also bear one-half of the loss" (art. 1804)*. If the Civil Code mainly concerns traditional "farm" animals (sheep, cattle, goats...), jurisprudence admits its application to domestic bees, since this lease "may be made for all kinds of animals which can increase or be of profit for agriculture or trade." *(art. 1802)*.

A contract model by private deed of 1806 consequently illustrates the profit-sharing regime of the hive in terms of beeswax and honey with half going to the leaser and half to the leasee : when the hives are withdrawn after beeswax is harvested if they weigh more than a certain weight in relation to the hives initially made available, the leaser must pay the excess weight just as he must pay half of the value of any additional hives resulting from his industry in comparison to the initial hives to the leasee. For his part, at the end of the lease, the leasee must pay the leaser half of the missing weight in relation to the initial weight of the hives; he must also abandon as many hives as necessary in order to meet the weight agreed upon in the terms of the contract, keeping any excess hives for himself (Beaunier, 1806)[7]. The weight therefore enables an assessment of the growth of the bee population in relation to the population initially made available, whilst the sharing of beeswax and honey during the life time of the contract as well as the sharing of additional hives at the end of the contract constitute the payment "in kind" of the industry and the care of the leasee. The gains, like the losses, are therefore easy to assess.

2. "The immobilization" of the colony, the basis of "hive-bees" consubstantiality

Within the context of the livestock lease agreement, remuneration is justified for one party by the ownership of the hives and the colonies they are home to; for the other party, remuneration reflects the work to maintain and develop the bee population at his disposal and to encourage production. By nature, bees are movable, since they are able to move by themselves, are difficult to catch and consequently difficult to own. Their ownership is based on a legal fiction formalized by the Civil Code: immobilization by destination. As stated in article 524 of the Civil Code, "*Animals and things that the owner of premises places thereon for the use and working, are immovable by destination. Thus, the following are immovable by destination when they have been placed by the owner for the use and working of the premises: (…) Beehives…"* (Michallet, 2013). Civil law refers to the "hives" and not the "bees": at no time is the ownership of bees expressly asserted by regulations, which only refer to the hives that contain them. On this point the beehive is "unwavering" as regards ownership rules. It is considered to be an accessory to the "stock" to which it belongs as article L211-8 of the Rural and Maritime Fishing Code illustrates, according to which "in cases where the beehive could be separated from the stock to which it is attached, it can only be displaced during the months of December, January and February". The attachment is such that the Civil Code must consider a dissociation of stock and the beehive, during the time when the bees *"can be displaced conveniently, bees being locked in their cell and numb with cold " (*Gadar, Year VIII).

The "hive-bees" consubstantiality means that the bee colony cannot be conceived without the hive which immobilizes it and permits its appropriation. This property of the immobilized colony

[7] The hypothesis described here is that of the simple livestock lease agreement of articles 1804 and following of the Civil Code, *"contract by which we give to another cattle to keep, feed and take care of, provided that the leasee will benefit from half of any increases, and that he will also bear half of any losses".*

is corroborated by the right to pursue that which swarms and escapes this legal fiction owing to its natural movement: as stated in article L. 211-9 of the Rural and Maritime Fishing Code, *"The owner of a swarm has the right to claim and recover it, as long as he has not stopped following it; otherwise, the swarm belongs to the owner of the land on which it has settled".* The attachment to the stock, the immobilization, therefore equates to ownership, but this ownership concerns the swarm as opposed to the bee. The latter is not legally (and biologically) individualized and is appropriated and exploited collectively, due to the impossibility of identifying it as an individual and of its attachment to a particular hive, and as such, to a particular owner. Domestic bee colonies, bred for the production of beeswax, honey and other products, are consequently immovable properties appropriated by the owner of the hives housing them. The latter consequently only has a right of claim to them if the swarm is immobilized in one of his hives.

3. –Bees as production animals

The Rural and Maritime Fishing Code classifies bees as "production animals", echoing the provisions of articles 547 et seq. of the Civil Code relating to "The right of accession to what is produced". The traditional production of honey and beeswax is consequently appropriated by the owner or his co-contractor in exchange for work to maintain the hives, placing them near to favorable sites for feeding and conserving them during the winter period… etc. A more realistic approach may consider that these procedures are simply the counterparty of what is extracted to the detriment of the colony, which must be compensated in order to ensure its survival until the next floral season: in its natural state, a colony of bees does not need man but this changes when the colony is *immobilized* in the hive and the fruit of its *work* intended for its single life-cycle is removed. Maintaining the bees' work force and guaranteeing the tranquility of their winter rest are consequently offset by the gains from beeswax and honey to the benefit of the beekeeper. The bee consequently upsets the traditional regime of animal ownership, since it is not recognized as an individual (swarm) and it constitutes an object of atypical ownership (as a hive content and not as an individual or a colony). Swarm ownership is only evoked when the latter leaves the hive, whereas the hive by itself benefits from the consideration of civil law when bees are found in it. These particularities benefit from an unusual prolongation with the valuation of a natural function of bees, pollination.

4. Remunerating the pollination service

The new issue of the remuneration of the pollination service can be questioned from a legal viewpoint. For a long time, the benefit of the bee's production was limited to its material components: beeswax, honey and other substances. For the past fifty years, it has exceeded this traditional approach to integrate the fruit production of certain plants, and therefore, food security and the resulting preservation of biodiversity, whilst ensuring the genetic diversity of plants. There are consequently a multitude of eco-systemic services provided by the "visit" made by bees to flowers. The pollination service provided by these particular worker bees shares this characteristic which is common to all pollinations in that it is not sought by the animals that perform it: it is seen as "accidental", even if in reality, it is the result of a complex biological process. However, this process may be sought by the owner of the colonies who can artificially guide the bees: this leads to distinguishing between "a global and passive service" carried out with no particular human intervention and "a targeted and active service" requiring human intervention to the benefit of a specific territory (Gerster, 2012). Such service has the cost of the intervention of the beekeeper and the equipment implemented, but nothing guarantees the pollination process in the desired conditions, nor that it will be carried out in its entirety by the bees in question. Therefore, the benefit is uncertain with regard to both the implementation process and the bees performing this pollination, even if there is ~~though~~ a

strong presumption that the bees present in the hives effectively pollinate nearby plants . The payment made within the context of the contract between the beekeeper and the producer consequently serves to remunerate a random service. This can justify the fact that it is not conditioned by the result of making the bees available, , or even that this service is totally absent from the stipulations of so-called “pollination” agreements[8].

If a service remuneration can exist for providing hives during a certain time, given the fees and expenses incurred (handling, transport, immobilization, loss of livestock...), the remuneration of pollination and associated services, considered separately, may surprise and raise questions as to their "appropriation" by the owner of the bee colony responsible for pollination. First of all, there is no service equivalence: the pollen and nectar which feed the colony[9] are harvested on flowers that do not belong to the hive owner, and the hive owner does not remunerate the plant owner for this “feeding” service, these plants being visited "naturally" by his bees and consequently "naturally" made available to the benefit of the beekeeper. Legally speaking, something is taken from something belonging to someone else, certainly with his implicit agreement, but it is still taken. In this perspective, given the reciprocal gains related to “plant/ bee” mutualism, pollination and the resulting fruit production should appear as compensation for feeding, without any other compensation being called for. As a consequence, nothing justifies remuneration while the feeding of bees is not due to the plant owner any more than the resulting honey and beeswax produced. If feeding and the production of honey are certain, pollination is much less certain and plant fertilization even less so, consequently calling on intricate service assessments at every level. There is, to a certain extent, an exchange of services: the provision of plants with a view to feeding the colony and apicultural production is “remunerated/compensated” through pollination, as the “making available” of bees is “remunerated/compensated” though feeding the colony and the profits related to honey and other products produced. In contrast, within the context of “guided” pollination with the express placing of hives, two services are likely to be involved and are even likely to justify financial intermediation: on the one hand, if transportation is involved, there are the costs incurred for making hives and colonies available and, on the other hand, there are the potential costs of the lack of or reduced pesticide treatment of plants during the plant visiting period, in order to avoid killing the bees, costs which are linked to the risk of a reduced or lost crop production. In this last case, however, there is a single risk and no expenses actually incurred, contrary to those related to the provision of hives. A reasoned crop management during the flowering period necessarily involves limiting pest control treatments on plants in order to prevent the mortality of pollinators and allow them to work for the benefit of the vegetable or fruit producer. Ultimately, the profit for the beekeeper is linked to the payment of the service of making the hives available and, secondly, the profit related to pollination and subsequent fruit production. Whatever the case, remuneration depends on the agreement between the two protagonists, the value of the service that can be disrupted by market forces: the scarcity of colonies on the one hand and the increase in pollination needs on the other, almost naturally leading beekeepers to search for profitability and to provide the service to the highest bidder. Scarcity and need determine the price, in keeping with market forces, whilst honey production becomes a somewhat secondary concern.

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[8] V. *infra*.

[9] Carbohydrate intake by nectar and protein, lipid and vitamin intake, mainly by pollen.

5. The legitimacy of rights on bees' labor

Aside from the provision of hives and the associated work, what legitimacy can such remuneration have? In other words, does the hive owner have rights to the eco-systemic pollination service and the associated services carried out by "his" bees? Or, on the contrary, should he be excluded from any profits from this point of view, with this eco-systemic service being considered as a common good over which he has no rights, even if "his" bees participate in it? This contractual management of bees in fact isolates one of their particular qualities, that of providing eco-systemic services. This function queries the legal regime of the services provided and their management in terms of property law and questions the relationship between bee colony ownership and these natural functions. However, there should be no confusion: it is necessary to distinguish between the "pollination service", ensured by the provision of hives to a contractual partner in order to assist the fruit production by his plants, which effectively characterizes a service provision to the benefit of the identified beneficiary, and the "eco-systemic pollination service" provided by the bees for a common and collective profit with no pre-constituted legal relationship or the idea of carrying out a "service" on the part of the beekeeper. The beekeeper's rights are undoubtedly better guaranteed in the first case, since they are linked to the contractual provision of hives, but the question arises from the point of view of the bees and the rights that the beekeeper has over them. Their appropriated "work force" outweighs the growth that ordinarily characterizes accession, given that fruit production benefits the plants' owner. The "eco-systemic pollination service" is the result of a mutual benefit, the "visiting" of flowers by bees allowing them to be fed and the production of honey for "private" purposes, while ensuring the fruit production and reproduction of plants which are as much of general interest as of personal interest. The inability to determine to which hive a bee belongs does not however allow the beekeeper to claim any rights; "his" bees participating as much as any other bee to this service.

6. The *transpropriation* of the eco-systemic pollination service

Beyond the question of the financial evaluation of the eco-systemic services consequently provided (Angel 1998; MEDDTL, 2009; Maris, 2014), several clues lead us to believe that ownership of this capacity to produce services is not as sovereign or more particularly, as personal as a first analysis could imply. In effect, we can wonder about the legal consubstantiality ~~effective~~ which would exist between the ownership of pollinator colonies and the services they can provide. This oscillates between the very strong link which would make the owner the sole beneficiary of their work, calling for a payment for the services provided, ~~-~~to a more ~~stretched~~ distant link allowing us to consider that the owner has no rights and cannot claim ~~no~~ any payment, aside from for his work as regards making hives available (displacement of hives...etc.). Like François Ost, we can wonder whether there would not be a possible transpropriation, namely a legal detachment that could operate between the ownership of the colony and this ability to provide services, due to ~~a~~ "a multiple use concession [on a same good] to a plurality of concession holders" (Ost,2003). Undoubtedly, the colonies belong to the hive owner, but their capacity to provide eco-systemic services would, in this perspective, belong to the collectivity. Just like a historical monument whose building belongs to its owner but whose historicity belongs to the community. At the very least, the collective and undifferentiated service of pollination, given the production of honey and other substances, is individualized and appropriated. Consequently, the owner "does not necessarily have the same level of control ~~intensity~~ over each aspect of his property" (Ost, 2003). If the beekeeper is "satisfied", as he always has been, with the traditional products of beekeeping (honey...), the sole goods he considers as being goods and which he effectively sought, he is, a priori, indifferent to other services, unless they are related to feeding and maintaining his colonies from which he makes a profit. There would therefore be a

'patrimonialization' of this pollination capacity in a more collective sense, that cannot be appropriated, justifying the intervention of the collectivity to preserve this service, support its management or regulate it to take account of general interest. The only certainty is that *"ownership of a good, either movable or immovable, gives a right to everything it produces and to what is accessorily united to it, either naturally or artificially. That right is called a right of accession »*[10]. For its part, pollination is more difficult to grasp: the property of what grows or fruit which is produced as a result of pollination is excluded, since it concerns the owner of the plant and not the beekeeper, who is simply the owner of the hive that houses the colony.

Pollination only serves to evaluate the exchange: the arborist or the horticulturist requesting the service is motivated by the profit derived from the plant, by the price that he's willing to pay for the service, based on the expected gain or the loss avoided. When the bee pollinates it provides a service as we have seen in article 524 of the Civil Code: the honey hive (and consequently the colony of bees that it houses) has been moved by the stock owner "*for the use… of the premises".* The beekeeper doesn't have particular right over the pollination, but rather over his bees which pollinate, which justifies the remuneration of his service consisting in the provision of bees to a third party (plant or fruit producer) within a voluntary and sought framework. His rights over the bees' service is based on his ownership of the colony. However, it is not the pollination which constitutes the market service, but rather the provision of hives with a view to pollination. Remuneration is therefore founded when the service is individualized, provided to an identified third party which has expressly requested the service and the fruit of particular work on the part of the beekeeper (displacement of hives...etc.) according to a contract, whatever its form. For his part, the beekeeper is motivated ~~however~~ by the survival of his colonies: should he refuse the pollination service offer ~~it~~, his good may decline and eventually disappear. He is therefore dependent on this service request, unless he considers that his bees are simply a "pollination machine" which he can replace once they are destroyed, without worrying about their sustainability~~.~~

On the other hand, what is the situation when the pollination service is provided to an anonymous collectivity, a non-individualized service beneficiary, with no advanced solicitation, no contract or particular constraints for the beekeeper (particularly when his hives are fixed) or with the simple purpose of honey production (transhumance of hives according to the flowering calendar)? Can the beekeeper claim a right over the service provided by the bees for the benefit of the collectivity and ask to be paid in this capacity? Furthermore, if pollination is clearly in the general interest, can the collectivity intervene to facilitate or perpetuate the achievement of this service by conducting actions to the benefit of pollinators (financing of floral fallow…) or of the beekeeper (financing the placement of the hives…) or by imposing ownership constraints? The development of the financial valuation of this eco-systemic service in the form of economic incentives - more than direct payment - shows that we have surpassed the question of legitimacy to wonder about the modalities of this valuation.

II. - POLLINATION AGREEMENTS, FINANCIAL VALUATION OF THE ECO-SYSTEMIC SERVICE OF BEES

Because of the scope of action of these insects (3 km), the bees' domestication due to their placement in hives does not permit the pollination of certain sectors to be ensured, much to the discontent of producers (vegetable farmers, horticulturists, arborists...), since the success of crops depends on this service. In the face of the regression in numbers of pollinators severely threatening the durability of these activities, an "industrial" transhumance has been organized in certain countries (United States, Canada): tens of thousands of hives have been

[10] C. civ., art. 546.

moved over distances of up to 20 000 kilometers per year (Bruneau and Burget, 2008)[11], (as opposed to an average of one hundred kilometers per year in Europe). *"The commercial bee" (*Downing, 2007) has been born, whose service is subject to negotiations and contracts, in the form of *Pollination Agreements* (or *Pollination Contracts*) . Though non-written, the pollination agreement still constitutes a contract between a beekeeper and a farmer, though which the first undertakes to put at the disposal of the second a number of hives during the flowering season of a particular crop and to install the hives in the area specified by the farmer or, *"if no area is specified, to install them in a place the beekeeper considers the most appropriate to ensure maximum pollination coverage"* [12]. The agreements are generally concluded before the beginning of winter, in such a way as to enable the beekeeper to prepare his season and ensure the availability of pollinators. An "official" definition of this activity has been issued by the French Ministry of Finances in order to submit it to an agricultural tax regime and avoid the service provision tax regime which is less favorable: This activity consists "*in the provision of hives for a fixed-term to farmers in order to increase the production value of their plantations through pollination work carried out by bees"*[13].

1. A tried and tested agreement mechanism

The existence of these agreements is quite ancient: the *Insect Pollination of Cultivated Crop Plants* manual, which already forty years ago, presented pollination and service contracts(MacGregor, 1976), referred to the prices of making hives available and the correlation of the strength of colonies with the potential rental rates as they had been studied during the twenties (Farrar, 1929). It is the pollination service itself which is concerned: *"Beekeepers have an opportunity and a challenge to contribute more fully to the development of our agricultural resources by supplying the bees needed for pollination and making honey available to more people. The pollination of fruit and seed crops will be proportional to the increase in honey production, because both depend upon the number of blossoms visited by the bees"* (Farrar, 1947). Through experience, since the eighties, several tens of contract models have been proposed in the United States and Canada, by official agricultural organizations as well as by beekeeping or entomology journals, and have served as sources of inspiration for the models available in France.

2. A simple obligation of means

This agreement imposes a reciprocal obligation of means but not a performance obligation. The contract model proposed in France by Apiservices[14] imposes for example on the beekeeper "to place his bees on the crops for the time required for effective pollination, estimated (...) at approximately x days, with a maximum duration of 15 days"; "to agree to show the strength of his colonies following random sampling conducted by the arborist"; "to ensure that the colonies remain in good pollination conditions for the duration of the contract"; " in the event of persistent bad weather, to feed his colonies to maintain them at good

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[11] *"Wintering in Florida to move on to California for almond trees and then to Oregon for fruit trees (apple, pear, cherry,...) ; then transhumance for small fruit such as blackberries, blueberries, strawberries, and then the production of vegetable seeds (carrots, onions, cabbage), leguminous plants(clovers...) ; finally, they go down south for wintering".*

[12] According to the pollination contract model made available to beekeepers by the Regional Directorate of Quebec Capital of the Ministry of Agriculture, Fisheries and Food of Quebec (Revised Version of April 2016).

[13] *"For tax purposes, this pollination activity can be regarded as exercised within the framework of a beekeeping operation. It is therefore accepted that the revenues derived from this activity should be taxed in the category of agricultural profits [CGI, art. 63, al. 3], the same way as other products from beekeeping"* (Bull. officiel des impôts - BA-Champ 10-10-10-20140306 du 3 mars 2014. The site "Bulletin Officiel des Finances Publiques-Impôts" (BOFiP-taxes) brings together, in a single and consolidated database, the set of comments concerning tax legislation published by the Office of the General Directorate of Public Finance).

[14] Society that promotes the Bee *"as a pollination agent"*.

population levels" In return, the arborist is committed " during the rental period, to refraining from using any phytosanitary treatment involving products which are toxic to bees or whose use is prohibited during the flowering period (including on weeds"; "in the event of mandatory phytosanitary treatment posing a danger to ~~to~~ bees (eg: end of flowering period), the beekeeper should be informed three days in advance to enable him to remove or enclose his colonies."

3. Agreement concerning the availability of hives

If pollination constitutes the purpose of the contract, it is ~~lacks~~, however absent from the service remuneration conditions: the beekeeper must provide an agreed quantity of hives, *"in exchange of which, the arborist will pay him x Euros per hive, for the displacement and maintenance fees of these hives, for a duration of X days".* In reality, the contract is much more focused on the provision of hives and the associated bee colonies than on pollination, which can be explained by the fact that *"successful pollination does not imply successful fertilization (…). The price reflects the distances required to move the colonies, the type of crop, the amount of manipulations and any additional costs » (*Skinner, no date). Pollination itself, whilst it appears in the title of the contract, is in contrast ignored in the stipulations of American and Canadian contracts on which the contracts proposed in France are based. Whilst the latter mention pollination, they do not make it a performance obligation: in this way, concerning remuneration, "the producer undertakes to pay the following fees for the pollination services: x colonies at a cost of X per colony for a total of X". However, provided they meet these obligations, "the beekeeper cannot be held responsible for any loss or decrease in production as a result of the pollination carried out within the context of the present contact". Pollination therefore constitutes the objective of the provision of hives, but it is not formally the objective. The beekeeper is not bound by any productivity guarantee since he has no control over the behavior of bees, the climate or any other events likely to affect flowering or honey production. Agricorp, a body attached to the Government of Ontario (Can.), has in fact compiled an insurance contract to the benefit of arborists for whom certain fruit crops would be affected due to *"unavoidable pollination failure due to adverse weather conditions"* (Agricorp, 2016), but without referring to "guided" pollination as a means of preventing crop decreases or losses.

4. The success of pollination agreements

This particular exploitation of bees' *labor*[15] is in the process of replacing remuneration related to the production and sale of honey. It sometimes reaches nearly half of beekeeper income, depending on the periods of the year and the plant species to be pollinated. Consequently, , in the United States, "*one out of every two beekeepers does not live from the honey trade but rather from the transhumance of his hives. Unlike what is happening in Europe, it is a veritable industry where beekeepers load several hundred colonies into trucks and travel the length of the country to sell their pollination service to large fruit and vegetable farms. The reduction in bee populations can already be felt: in the past, beekeepers use to rent bees colonies for between 45 and 65 dollars (32 to 46 Euros). This year, the price paid by almonds producers is in the region of 170 dollars (120 Euros) per colony. Overall, the cost of pollination has increased for all types of producers"* (Downing, 2008). The pollination industry, which only uses bees, is estimated at $16 billion for the United States alone (Gallai and Vaissiere, 2009). To a certain extent, this increase is related to the structuring of the offer in relation to demand, with the consolidation of the itinerant beekeeping activity. It is also explained by a decrease

[15] We will use the term "labor" concerning the bees' production activity in reference and equivalence to article L.211-10 of the Rural and Maritime Fishing Code that uses this term to refer to silkworms' activity: "production animals" like bees, they "cannot be seized during their work".

in pollination service offers due to *Colony Collapse Disorder*, which needs to be taken into account in relation to the increase of spaces to be pollinated (Morse and K. Flottum, 1998). The contract consequently corresponds to market forces: pollination has a market value or, more precisely, a value has been conferred on pollination through pollination contracts (Sagili and Burgett, 2011). Needs, like pollination practices, differ according to states and continents: in France, therefore, pollination income only represents 2.3% of total global turnover as opposed to 90.7% for hive products (honey, pollen, propolis, royal jelly, beeswax) (Gerster, 2012a). However, hive provision price is difficult to determine because it cannot be set according to a reference of what manual pollination would cost, at the risk of making the natural service prohibitive; therefore, the sole reference remains the cost of making bees available (Bastide, 1993).

5. -The price of the industrialization of pollination

A price is omitted in these contracts: the price which is "borne" by the pollinators consequently made available and the potential risks to biodiversity. As noted by Professor Dave Shutler within the context of his interview with the Standing Senate Committee on Agriculture and Forestry: *"Honeybee losses in recent years can be largely ascribed to increased industrialization of the bee industry. To make large-scale apiculture profitable, honeybees are sometimes transported long distances one stress of transportation might be being locked inside a hive for days while in transit, unable to get rid of waste, dead bees, et cetera". "In sum, industrialization of apiculture stresses honeybees by limiting their access to sufficient quantities and qualities of nutrition by exposing them to multiple pesticide residues, probably other contaminants (…), and to a suite of parasites with which they have not co-evolved. As is the case for pesticides, these stressors have multiple potentials for their own set of synergistic interactions" (Parliament of Canada, 2014)*.

We also have to take account of the risks to biodiversity: the assignment of these pollinators to well-defined sectors leads to the other sectors they would have been able to visit being neglected. However, the neglected sectors are not necessarily visited by other species due to their specialization, which can lead to a depletion of plant diversity and associated species. In order to limit this decline and encourage the protection of bees, various measures have been adopted to ensure the financing of the eco-systemic pollination service, irrespective of the pollination service contractually provided to the benefit of a producer, which the latter pays to the beekeeper.

III. – FINANCING OF THE ECO-SYSTEMIC POLLINATION SERVICE

Can the hive owner whose bees pollinate be considered as "a provider of the eco-systemic pollination service" able to benefit from "payments for eco-systemic services"? A priori no, given that it is the bees who are responsible for pollination. It is therefore not the beekeeper who "provides" the service in the true sense of the term. On the other hand, the maintenance of these hives and the bees that they shelter characterizes a service on his part, contributing towards the good realization of the eco-systemic pollination service. In this regard, he accomplishes an environmental service that can constitute the basis for payment to encourage him to realize the service or pay him for his action. As Karel Mayrand and Marc Paquin stress, the payment for environmental services is a mechanism *"which aims to promote positive environmental externalities through the transfer of financial resources between the beneficiaries of certain ecological services and the providers of the services or the managers of environmental resources"* (Mayrand and Paquin, 2004). Nevertheless, an uncertainty persists: do these aids characterize a remuneration or, on the contrary, compensation for the person who provides this service? The context in which the service occurs permits an answer to be given, as in the case of the transhumance of hives or that of the agri-environmental

subsidies dedicated to bees. It is therefore by intermediation that the eco-systemic pollination service is the focus of a payment, by financing the set of actions aimed to preserve this service.

1. The principle of payment for the preservation of eco-systemic services

Some economists believe that *"contrary to what the "payment for eco-systemic services" label can lead us to imagine, the purpose of the transaction within the context of this mechanism is not the eco-systemic service itself, derived from one or several ecological functionalities, which by nature, cannot be appropriated, , but the adoption of particular uses of resources (mainly land), or specific practices likely to maintain or restore one or several eco-systemic services".* In this hypothesis, what we are remunerating is "the human interaction permitting the preservation of eco-systemic services to be facilitated". Here, "the transaction namely focuses on an environmental service, in the sense of the services that people can render for one another by the intermediary of eco-systems", which justifies the use of the notion of "payment for environmental services". As noted by these economists, "certain authors tend to define environmental services solely from the perspective of the services provided by man to eco-systems, consequently reversing the logic and concealing the second part of the equation supposed to be taken into account by the mechanism, namely the dependence of human activities on the services derived from nature. Therefore, in order to remove such uncertainties that hinder the debate and the clarity of the mechanism, we suggest using the terminology "payment for the preservation of eco-systemic services (PPES)" (…)" (Guingand, 2014).

We will retain this last approach that places the emphasis on the objective of the maintenance or the restoration of eco-systemic services. Unlike other identified services which are rendered by appropriate elements of the environment (soil, plants…), the pollination service cannot be reduced to the mere intervention of the domestic bee *(Apis mellifera)*, an insect appropriated in its collective dimension (swarm) or the bumblebee *(Bombus terrestris)*, which is used for the pollination of certain plants in greenhouses. They must necessarily be associated with the cohort of non-domestic pollinator insects, otherwise the approach of payment for eco-systemic services related to pollination would be partial: it would in effect neglect all of the actions undertaken to maintain populations of non-domestic pollinator insects. Two distinct services must therefore be envisaged: the *eco-systemic service*, provided by pollinators for men and the *environmental service* that man provides for pollinators. However, the distinction is not really straightforward, because the complementarity of the two actions scrambles the reference points: hence, the environmental service which consists in maintaining flowering plants during the blooming period has the objective of maintaining an eco-systemic service while guaranteeing the durability of populations of certain pollinators, whereas the provision of the eco-systemic pollination service closely depends on the environmental pollinator protection service.

2. - The general interest of pollination as a basis for subsidies

The European Parliament has suggested an allocation key for beekeeper/bee services. After having noted that *"beekeeping and biodiversity are mutually dependent*", it stresses that *"via pollination, bee colonies provide important environmental, economic and social public goods, thus ensuring food security and maintaining biodiversity, and whereas, by managing their bee colonies, beekeepers perform an environmental service of paramount importance, as well as safeguarding has sustainable production model in rural areas"*[16]. Within this perspective, beekeepers are more than intermediaries, more than "simple" owners of pollinator bees: the

[16] European Parliament resolution of November 15,2011 on honeybee health and the challenges of the beekeeping sector (2011/2108(INI)).

good management of their colonies determines the good service provision. This management is in itself a service that justifies a financial reward in order to encourage them or help them to provide this service. However, do they have any choice but to ensure good management, as anything but would run the risk of losing their property or seeing a decrease in their honey harvest? They therefore strongly depend on a reasoned management of their bee populations whose productivity potential is conditioned by their behavior towards them and are therefore "captives" of the pollination to which they are finally dedicated. This dependence limits their means of action to claim interventions by the public authorities, because it is difficult to imagine a "pollination strike", which would result in the permanent loss of their "work tool".
Nonetheless, such a claim is not necessary: pollination being immediately recognized as being of general interest, their good offices with their hives making them service providers to the benefit of the community, ready to intervene as part of a collective interest in order to sustain the provision of eco-systemic services. Such a situation permits the material aid which beekeepers can request for the maintenance of their colonies to be legitimized, and the public community participates in this management because of the benefits it gains from it, collectively. This compensation and the resulting reciprocal interests bring us beyond the logic of aid which prevailed until now, although the terminology has barely evolved. There is an environmental service on the part of the beekeeper to allow the implementation of an eco-systemic service, the realization of one favoring the realization of the other without determining its existence: the bee does not need man to pollinate. However, human intervention contributes towards improving the service by strengthening the number of pollinators and/or by placing them in the vicinity of the plants requiring pollination.

3. Uncertainty on the classification of paymentss: remuneration or compensation?

European Union law is relatively silent in terms of qualifying the payments made in favor of beekeepers: remuneration or compensation of a service, compensation of a constraint, financial incentive, subsidy, *sui generis revenue*… it is difficult to rely on the fiscal qualification retained by the States to attempt to define its nature, because of the pragmatism they have shown in this regard, or the policy that they want to adopt. If the revenues derived from pollination activity are, in France, taxed according to the agricultural profits category[17], the state of Washington subjects the income derived by the beekeepers to the *"Business and Occupation Tax*", under the heading '*Service and Other Activities'*, as a "farmer": *"Farmer means any person engaged in the business of …providing bee pollination services".* Nevertheless, in order to take into account the economic impact of *Colony Collapse Disorder* on the agricultural sector, the activity had been exempted from this tax until the 1st of July, 2017, insofar as the beekeeper is eligible and registered (Washington State Department of Revenue, 2013). In these two cases, the state aid classification is called for .
The direct support to apiculture, accepted by the European Union, is not in the sense of the recognition of a particular service: in fact, it is about intervening *"in order to improve the production and marketing of apiculture products in the Community".* "*Member States may draw up a national program for a period of three years (hereinafter referred to as the 'apiculture program')": "in order to improve the production and marketing of apiculture products in the Community, national programs should be drawn up every three years, comprising technical assistance, control of varroasis, rationalization of transhumance, management of the restocking of hives in the Community, and cooperation on research programs on beekeeping and apiculture products with a view to improving the general conditions for the production and marketing of apiculture products. These national programs should be partly financed by the Community*". In addition, the member states may grant "*specific national aids for the protection of apiaries disadvantaged by structural or natural conditions or under economic development*

[17] V. *supra*.

programs, except for those allocated for production or trade"[18]. Community co-financing, provided by the European Agricultural Guarantee Fund (EAGF) stands at 50 % of the expenditure incurred by the Member State under the National Program[19]. The production of honey and other hive products are the focus of these subsidies, or at least they were initially, and it is only recently that pollination has found its place in the mechanism, first of all allusively, then more explicitly. The subsidies developed in favor of pastoral apiculture are highly symptomatic of the extension of the approach.

4. The particular case of hive transhumance

Transhumance is a particular hive exploitation mode, which is different from sedentary apiculture: hives are moved in order to follow honeydew, increase production and diversify honey varieties. This is not a new practice (Lemeunier, 2006). It should not however be confused with the controlled pollination linked to pollination contracts, since the first objective of transhumance is honey production[20]. In its Resolution of October 9, 2003 on the difficulties faced by the European beekeeping sector, the European Parliament firstly focuses on the fate of insects before worrying about the effects on pollination and biodiversity: *"the health of domestic bees is not just a matter of concern to beekeepers; it is also indicative of the state of the environment in general and of pollinating fauna in particular". "This bee mortality is indicative of problems in current beekeeping which are multi-factorial in origin and is concerned at the loss of biodiversity caused by the destruction of insects, in particular pollinating insects".* In line with this resolution, the Council Regulation (EC) No 797/2004 of April 26, 2004 on measures improving general conditions for the production and marketing of apiculture products considers that one of the main functions of beekeeping is *"the maintenance of ecological balance*" and the promotion of the *"rationalization of transhumance"* within the context of subsidized apiculture programs. The French circular of November 8, 2004, which sets out the conditions for granting Community subsidies to beekeeping, never evokes the interest of pollination within the context of transhumance. Nor is it mentioned within the more general framework of the beekeeping activity. Taking stock of the implementation of measures relating to the beekeeping sector from Council Regulation No

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[18] Council Regulation (EC) n° 1234/2007 of October 22, 2007 establishing a common organization of agricultural markets and specific provisions for certain agricultural products (Single CMO Regulation) : *OJEU n° L 299, 16 nov. 2007, p. 1*. The latter rationalizes the common organizations of the previous market each covering different products or groups of products on the basis of a basic regulation proper thereto, and in particular the Council Regulation (EC) No 797/2004 of April 26, 2004 on measures improving general conditions for the production and marketing of apiculture products *(EUYO No. L. 125, 28 April 2004, p.1)*.

[19] The measures financed by the European Agricultural Fund for Rural Development (EAFRD) are excluded from the apiculture program: In conformity with the Council Regulation (EC) No 1698/2005 of September 20, 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) *(OJEU No. L. 277, 21 oct. 2005, p. 1)*, a same action may not be the subject of a payment under the framework of the apiculture program, and under the framework of another Community aid regime at the same time. This solution has been confirmed by Regulation (EU) n° 1305/2013 of December 17, 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) n° 1698/2005 *(OJEU n° L. 347, 20 déc 2013, p. 487)*. As indicated in the decision of the Director General of France Agri-Mer of September 13, 2013, with regard to the implementation of the French three-year bee program 2014/2016 *"The Community funding allocated to each Member State is determined on the basis of its relative share in the community bee census. In France, this proportion is fixed at 10.42% which generates 3.52 million euros per year the Community co-financing for 7.05 million euros of planned spending in the French program" (*v. also D. No. 2013-820 of 12 seven. 2013 related to the national aid program of the beekeeping sector for the 2014 to 2016 receipts: *JO 14 sept. 2013, p. 15485*).

[20] The Council Directive of July 22, 1974 on the harmonization of the laws of the Member States relating to honey (OJEC No. L. 221, 12 August 1974, p. 10) is only interested in honey, without worrying about the conditions of its production. The following guidelines are heading the same direction *(Council Directive N° 2001/110/EC of 20 December 2001 relating to honey: OJEU n° L. 10, 12 January 2002, p. 47 and Council Directive n° 2014/63/EU of 15 May 2014 : OJEU n° L. 164, 3 June 2014, p. 1)*.

1234/2007 (Single CMO Regulation) which codifies and replaces Council Regulation No 797/2004, the European Commission reminds that *"The overall goal of the program is to improve the general conditions for the production and marketing of apiculture products in the Union".* However, it insists for the first time on the fact that *"in several Member States, transhumance is crucial to meeting the nutritional needs of bees and ensuring the pollination of plants"* and that some Member States *"support transhumance because of its importance for pollination"*[21]. In the meantime, in its Resolution of November 15, 2011 on honeybee health and the challenges of the beekeeping sector, the European Parliament went even further in its beekeeping interests analysis: beekeeping *"provides an important ecosystem service via pollination, which contributes to the improvement of biodiversity by maintaining the genetic diversity of plants*". The Parliament *calls on the Commission to consider the possibility of creating a special scheme for assistance to beekeepers within the framework of the direct aid scheme, for example through bee colony payments, which will (…) ensure bees continue to act as pollinators*". It particularly notes *"a decrease in the number of bee colonies has been reported in both the EU and other parts of the world"* and which *"in the event of a marked intensification of this trend, farmers in the EU, as well as those in other parts of the world, may have to resort to human-assisted pollination, which would entail a twofold increase in expenditure on pollination".* It is then concerned about the fact "*that increased mortality among honeybees and wild pollinators in Europe would, if left unchecked, have a profound negative impact on agriculture, food production and security, biodiversity, environmental sustainability and ecosystems".* He calls on the Commission *"to clarify, in the forthcoming reform of the CAP, the support measures and aid to be assigned to the European beekeeping sector, taking account of the environmental and social public goods that honeybee colonies provide via pollination and of the environmental service performed by beekeepers in managing their bee colony".*

5. Agri-environmental-climate measures for honeybees

The protection of bees and their pollination function is the subject of particular financial subsidies within the framework of the new Common Agricultural Policy (CAP) developed over the period of 2014-2020. However, this "greening" of agricultural payments is nothing new: the first "local agri-environmental operations" defined within the framework of the CAP, though not specifically targetting pollinators, permitted this objective to be met by encouraging the development of plant diversity. It consisted in promoting the "*ways of using agricultural land which are compatible with the protection and improvement of the environment, the countryside, the landscape, natural resources, soil and genetic diversity"*[22]. Nevertheless, the measure focused more on an environmental service than an intervention in favor of a particular eco-systemic service, since it consisted in ensuring that pollinators had access to a healthy and varied "food source".

It has howeverpre-figured in the agricultural policy developed since 2007 on the basis of which the Member States were able to introduce "Agri-environmental measures" (AEM), then "Agri-environmental-climate measures" (AECM) under the aegis of the new CAP, with specific components. France has consequently established a mechanism specifically dedicated to bees, the AEC "EHBPP (API in french)" (Enhanced Honey Bees Pollination Potential). This measure seeks to ensure that beekeepers modify their practices, namely by extending

[21] Report from the Commission on the implementation of the measures concerning the apiculture sector of Council Regulation (EC) n° 1234/2007 (COM/2013/0593 final).

[22] Council Regulation (EEC) n° 2078/92 of June 30, 1992 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside: *OJEC n° L 215, July 30, 1992, p. 85.* This regulation was repealed by Council Regulation (EEC) n° 1257/1999 of May 17, 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations : *OJEC n° L.160, 26 June 1999, p. 80.*

pollination zones in order to "*improve the pollination potential of honeybees by modifying beekeeping practices in order to better implement this activity in such a way as to contribute towards biodiversity". "A part of the hives must be placed in areas which are labeled "interesting for biodiversity".* As it is reminded when each campaign is launched "*The EHBPP measure is a devolved measure, based on national specifications, with regionalized options"* [23]. For the beekeepers concerned, the mechanism imposes *"an increase in the number of locations being used, with the localization of a minimum proportion"* in these areas, the effectiveness of the measure is assured *"by minimum distance obligations between two locations, a minimum number of colonies per location and a minimum occupation duration".* The specifications, which are the basis of the commitment, impose a doubling of the number of locations per batch of 100 colonies (4 as opposed to 2) *"in order to ensure a better territorial coverage by pollinator insects".* It also imposes a minimum number of locations in areas of interest to biodiversity (Natura 2000 areas…): These areas are defined on a regional scale *"and represent a minimum of 25% and a maximum of 50% of the regional territory".* The mechanism only concerns professional beekeepers as , unless a specific regional measure of derogation is in place, they must engage at least 72 hives (colonies). The minimum distance between two locations must be 1000 meters, except in cases where natural obstacles are present (ridgelines and collars in a mountain area, groves), in which case this distance is reduced to 500 meters. There must be at least one location per 24 colonies over one year; these locations that can be fixed or transhumant hive locations. Colonies must remain in place for at least 3 weeks on each location. As a reward for compliance with specifications, beekeepers receive a 21 € subsidy per engaged hive which is paid on an annual basis in exchange for a 5 year commitment[24].
Like directed pollination, this mechanism has to deal with the health rules which determine hive displacement: the beekeeper must namely report *"every transportation of bees outside of the department of origin (…) in the days which precede or follow the displacement"*[25] to the veterinary services. Other States have adopted even stricter measures: some Swiss cantons oblige hive owners wishing to practice pastoral or floral beekeeping to apply for an authorization until May 1st of each year. This authorization is only granted after checks which namely certify the good health of colonies, and that the area is not sequestered for health reasons[26]. Others, more generally, impose that all displacements of bees from other provinces or regions are subject to prior authorization, *"setting out the conditions permitting this displacement."*[27]

However, these measures do not characterize a veritable payment for the eco-systemic service provided by domestic pollinators. The beekeeper is supported in his work to follow honeydew or put in place and maintain his hives, whereas the collectivity seeks to benefit from an increase in pollinator potential: It is, to a certain extent, paid "in kind" for the environmental service provided to pollinators, and more generally, to biodiversity.

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[23] For each DDT or DDTM, v. *"Notice of information Amelioration of the pollinator potential of honeybees for the preservation of the biodiversity (API). Campaign 2015"*.

[24] V. Instruction DGPE/SDPAC/2015-1070 of December 10, 2015 concerning the Technical Statement 2015 Agri-environmental and Climate measures (AECM) and subsidies for biological agriculture, p. 52 s.

[25] Amended order of August 11, 1980 concerning the health mechanisms to combat disease among bees: *JONC 1st oct. 1980, p. 8684.*

[26] Ruling December 9, 1997 concerning the execution of federal legislation epizootic diseases and the elimination of animal by-products, art. 27 (Canton of Jura - Switzerland).

[27] Ontario (Canada), Bees Act, RSO 1990, c. B.6, art. 12.

IV. - THE ENVIRONMENTAL SERVICE TO PROTECT POLLINATORS

The protection of pollinators with the objective of benefitting from their services is the result of an environmental service whose implementation depends on numerous and various tools, but whose main characteristic is to maintain a "healthy" environment. This is particularly true of agri-environmental and climate measures, certain aspects of which help to combat bee mortality. It is a question of maintaining pollinator-friendly spaces as well as developing various forms of fallow land or, more generally, good agricultural and environmental conditions, which may be accompanied by pesticide regulation.

1. Agri-environmental-climate measures and apiculture

In its Resolution of November 15, 2011 on honeybee health and the challenges of the beekeeping sector, the European Parliament (mentioned above)(calls on the Member States *"to lay down agri-environmental measures geared towards apiculture in their rural development programs and to encourage farmers to engage in agri-environmental measures supporting 'bee-friendly' grasslands on field margins and to employ an advanced level of integrated production, taking a holistic approach to farming and using biological control where possible"*. It thus complements a previous recommendation: the Parliament calls on the Commission *"to improve coordination of the various research programs carried out in Member States with a view to establishing an action plan for tackling bee mortality; it points out that this should include mainstreaming sustainable, pollinator-friendly farming practices by avoiding monocultures without rotation"*[28]. According to the recommendation of 2011, these pro-biodiversity actions *"are also vital in the non-farm sector : that green spaces along roads, verges of railway lines, forest cuttings for energy transmission networks and public and private gardens cover substantial areas where rational management methods can considerably increase pollen and nectar resources for bees and pollinating insects"*. The maintaining or recovery of plant diversity is therefore crucial to improve nectar and pollen potential in order to maintain and/or to reconstitute pollinator communities. Various measures have been developed for this purpose, such as *rotational agri-environmental measures:* the practice of growing different crops in succession on the same land chiefly to preserve the productive capacity of the soil is allowed to alternate the food for the bees (protein crops). The AEC "*agri-environmental pasture premium*", however, tends "to preserve prairies and encourage an extensive management of these surfaces through respectful practices toward the environment". Its specifications prohibit plowing permanent grassland and impose that the fixed components of biodiversity on the farm are present on at least 20% of the surface (permanent wet grasslands, protection of grazing areas and their withdrawal from production…) (Saddier, 2008; Heidsieck and Allier, 2013). Other measures concern lowering the use of pesticides which affect the biotope of pollinators and the pollinators themselves, in order to maintain the areas which are beneficial to them.

2. Maintaining favorable spaces for pollinators

The survival of wild and domestic pollinators is conditioned by the quality of their environment as well as by the availability of food. Anthropogenic changes in land use lead to the gradual disappearance of-bee-forage plants, due to their artificialization, the replacement of plants by crops or the use of herbicides for the upkeep of certain surfaces. Various proposals were developed to ensure the coexistence between the human occupation of soil and pollinators and, more specifically, between agriculture and pollinators. Advocating for "Recovering the necessary biodiversity for beekeeping and beyond that, for all agriculture", the French plan for the sustainable development of apiculture (Prev.) speculates that *"the surfaces said to be*

[28] European Parliament resolution of November 25, 2010 on the situation in the beekeeping sector (P7_TA(2010)0440).

of 'ecological interest' (…) would indirectly once again become of 'agricultural interest' thanks to the strengthening of the pollination service". This paves the way for farmers and beekeepers *to "find a common interest for an intelligent application of the environmental objectives of the European Union for the CAP reform": "fallow land set aside for apiculture, strips of grass and flowers,* intermediate crops with bee-forage plants, floral INTC (intermediate nitrate-trap crops), *, flowered hedges and slopes and acacia groves, cultivation of fodder legumes, growing methods favoring apiculture (alfalfa flowering), cultivated varieties of interest to apiculture (for example, in the case of sunflowers, consideration of attractiveness criteria for nectar and the quality of pollen in the variety selected)"* (Gerster, 2012 b). The idea is not new, but it presents the particularity of promoting its integration within the Common Agricultural Policy (CAP). This policy will be developed with the new CAP: the eco-conditionality established in 2013[29] maintains the per-hectare subsidy along with a "green" payment (30% of the sum of direct payments) subject to certain agricultural practices being respected. These conditions may include maintaining an "ecologically valuable area" (EVA) *"on the agricultural surface"* of at least 5 % of arable land (~~on~~ increased to 7 % from 2017 for farms that exceed 15 hectares), to which the surface of EVA excluding arable land is added. These surfaces namely concern land lying fallow, terraces, buffer strips, ("including buffer strips covered by permanent grassland, provided that these are distinct from adjacent eligible agricultural area*")*, areas with catch crops, or green cover established by the planting and germination of seeds and the areas with nitrogen-fixing crops (peas and field beans, lupins, lucerne, soya, clover…), which offer a multitude of opportunities for pollinators. The new CAP also establishes "greening" equivalences which integrate existing practices with equivalent or higher benefits. We can namely mention the ecological set-aside, "the management of buffer strips and non-cropped field margins (cut regime, varieties of local or specified grasses and/or seeding regime, reseeding with regional varieties, no use of pesticides, no spreading of livestock effluents and/or mineral fertilizers, no irrigation and no soil sealing)" and the "borders, bands and parcels in the managed field for certain types of wild flora or fauna (herbaceous borders, protection of nests, bands of wild flowers, mixture of local seeds and non-harvested crops)[30]. Some of these techniques have been developed within a non-agricultural framework (roadside maintenance), while others have been the subject of agreements in parallel to agricultural subsidies, mainly for the farms unable to benefit from these subsidies (lower surface area than the required surface area, area concerned outside of the agricultural surface area …)[31].

3. Contrasting effects of beekeeping fallow

Maintaining vegetation during a period which is favorable for flowering can even be the objective of the fallow land developed for apicultural purposes (wild-flower set-aside, bee-flora set-aside). The aim is to create plots composed of different floral mixtures chosen for their apicultural interest, with the spreading of the blossoming period to compensate the impoverishment and banalization of flora and provide food resources to pollinating insects (Sebillotte, 2007). Maintaining this co-viability is controversial in the scientific community

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[29] Regulation (EU) n° 1307/2013 of December 17, 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy: *OJEU n° L 347, 20 Dec. 2013, p. 60.*

[30] Regulation (EU) n° 1307/2013 of Dec. 17, 2013, appendix IX.

[31] "Parallel", and not necessarily "complementary" as soon as farmers are not eligible to the actions listed in the framework of non-Agricultural - non-forestry - Natura 2000 contracts, and related to the maintenance of open environments by mowing: A mowed plot must be notified within the framework of the common agricultural policy and cannot therefore be the subject of a non-agricultural - non-forestry-Natura 2000 contract. In addition, these actions are financed within the framework of the AECM (Instr. DGPAAT/SDDRC/C2012-3047 of April 27, 2012 relative to the contractual management of Natura 2000 sites largely terrestrials in application of articles R. 414-8 to 18 of the Environmental Code, § 3.1.2.2.2).

because *"what benefits domestic bees may not necessarily benefit wild species".* A high density of honeybees may *"discourage other pollinators in the immediate vicinity"* and lead to their regression. *"However, most wild plants need wild pollinators and whilst the domestic bee ~~Honey bee~~ is a generalist, it does not feed on all plant species. Therefore, if ~~if~~ the domestic bee is overly encouraged, it~~,~~ increases the risk of reducing wild, cohabitating species, and consequently, wild plants".* In addition, using horticultural varieties can initiate competition among plant species and lead, in the long term, to a depletion of wild varieties (Gadoum, 2007). In other contexts (pollination of a same floral variety), other observers~~,~~ highlight a functional synergy between pollinator communities once inter-specific interactions can modify the behavior and increase the efficiency of pollination: *"In orchards with non-Apis bees, the foraging behavior of honey bees changed and the pollination effectiveness of a single honey bee visit was greater than in orchards where non-Apis bees were absent" (*Cl. Brittain and co, 2013).

4. Good agricultural and environmental conditions

The wild-flower set-aside and bee-flora set-aside participate in the "good agricultural and environmental conditions" (GAEC) regime set up pursuant to the Council Regulation n° 1782/2003 of September 29, 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers[32]. From the time that *"the land set aside shall be maintained in good agricultural and environmental condition"* and *"it shall not be used for agricultural purposes and shall not produce any crop for commercial purposes."*, farmers may be required to comply with these good conditions set out in Appendix IV of the Regulation. This includes "*Protecting soil through appropriate measures"*, by a "*Minimum soil cover*" and a *"Minimum land management reflecting site-specific conditions"* as well as *"Ensuring a minimum level of maintenance and avoiding the deterioration of habitats"*, which involves "*Protecting permanent pasture*" and the "Retention of landscape features". It is a far cry from the protection of bees, but in its special report 8/2008 « Is cross compliance an effective policy ?" the European Court of Auditors notes, *"With respect to cross compliance, Member States have considerable room to define the obligations imposed on farmers, especially for GAEC standards. Where cross compliance and agri-environment apply to the same objects (landscape elements, biodiversity, etc.) this means that the level of agri-environmental obligations, and consequently its effects, are determined by the level of cross compliance obligations"*. (*The European Court of Auditors*, 2008). This latitude is specifically illustrated in the "specific fallows" (wildlife set-aside land, wild-flower set-aside or apicultural set-aside) which, under the rules of good agricultural and environmental conditions, are included in "*landscape features*"[33]. On the other hand, non-cultivated lands (i.e. the non-producing areas that are beyond the areas benefiting from subsidies for fallow or arable crop area payments for land set aside) may not be the basis of an agricultural activity, which includes the establishment of hives, which is prohibited in this context[34].

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[32] *OJEU n° L. 270 of oct. 21,2003, p. 1.*

[33] Rural and maritime fishing Code, art. D. 615-50-1 ; Ministerial order of July 13, 2010 related to rules of good agricultural and environmental conditions (GAEC): *JO 17 July 2010, p. 13257*, at last amended by Min. order of April 15, 2014 related to the eligibility of some surfaces: *JO 20 ~~of~~ April 2014, p. 6974*. See also technical instruction of June 3, 2014 with regard to surface payment for 1st pillar of CAP campaign 2014: for the floral fallow, 1 ha is declared equivalent to 1 ha of topographical elements while for the bee fallow, 1 ha is declared equivalent to 2 ha of topographical elements.

[34] For example, Order n° 164 DDAF of 25 April 2006, setting the rules related to the good functioning of agricultural and environmental lands, and the maintenance of fallows of Côte d'Or departement.

5. The pesticides regulation

However, this environmental service to pollinators can only be effective if it is accompanied by measures to make their environment healthier, through the regulation of the use of phyto-pharmaceuticals (Safety Authority, 2013). If the placing on the market of these products is the focus of prior tests on their lethal effects for pollinators[35], various provisions have also been adopted to promote a reasoned use for the benefit of these pollinators. This is the case for numerous environmental services "paid for" in this capacity and which are, in any case, compensated. Various AECM therefore include provisions on the reduction or the prohibition of the use of chemicals and their financing implicitly integrates their consequences for farmers. Therefore, specifications of the "Agri-environmental grass premium" AECM ban chemical weeding on agricultural plots under contract and impose a non-chemical control of brushwood. However, there is no correlation between a subsidy granted in this regard and the extra cost for the farmer related to the use of other techniques. Territorial farming contracts better corresponded to this approach: according to Regulation No 1257/1999 of May 17, 1999, they provided that the level of subsidies "*is adopted for each action or agri-environmental measure, set out in a standard measure, based on the loss of income incurred and additional costs resulting from the agri-environmental commitments and the need to provide a financial incentive beyond the duly justified losses and over-costs. This additional financial incentives may not exceed 20% of the loss of income and over-costs, with the exception of that related to specific commitments duly justified and specified in the description of the measure, for which a higher rate can be set when this is essential for effective implementation of the measure. The calculation of income loss and additional costs resulting from the commitments is based on the level of reference for usual good farming practices in the area where measures or a combination of measures apply"*[36]. The new sustainable agriculture contracts are inspired from similar data and characterize a contractual regulation of the use of pesticides[37]. The incentive, which implies a spontaneous approach, has therefore been preferred to a more binding, non-compensated regulation.

V. Conclusion

The anthropogenic approach to pollination clearly illustrates the interdependence of social and ecological systems. If pollinators can do without man, the contrary is far from certain because nature is difficult to imitate. This situation is far from simple: the natural relationship between insects and plants is thwarted by the influence of human activities on ecosystems and imposes the regulation of these activities to enable it to continue. This regulation is not easy because of the complexity of the relationships that the law maintains with biodiversity in general, and with bees in particular.

1. Thwarted legal relationships

These relationships are indeed particularly disturbed by a series of natural factors that require legislation to adapt–since it struggles to leave behind its traditional patterns. The property law, which governs relationships between humans and animals, is consequently subject to the peculiarities of "domestic" bees. The beekeeper does not formally own bees, but rather the hive : the insect cannot be domesticated in the classical sense of the term and

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[35] V. Regulation (EU) n° 1107/2009 of 21 October 2009 concerning the placing of plant protection products on the market**:** *OJEU n° L 309, 24 Nov. 2009, p. 1*.

[36] Order of 8 November 1999 on aid granted to holders of territorial farming contracts by the financing fund of territorial operating contracts, art. 3: *JO 9 Nov. 1999, p. 16684*.

[37] Order of October 30, 2003 related to the aid granted to holders of contracts for sustainable agriculture, art. 2: *JO 7 Nov. 2003, p. 19043*.

remains ‘wild’, as proved when the swarm escapes. The link to ‘home’ that characterizes domestication is therefore a legal fiction, just like immobilization - that of the hive - which fictitiously absorbs its content - the bees – remains movable ~~mobile~~. Without the hive, there would be no appropriation; without the swarm, there would be no appropriated bees: given that, as a social insect, the domestic bee has no individual existence. Bees cannot be individualized, because they cannot be naturally individualized - they have no distinctive signs and no possibility of surviving without the colony. The law must therefore be adapted to these natural contingencies and invent a specific legal regime. The same difficulties are faced when tackling

pollination, which largely escapes the rules of accession: pollination is not a product of the hive in the traditional sense of the word, but it is produced by the occupants of the hive, insofar as it is possible to be certain of the effective action of the bees in a given ~~in~~ hive. The invention~~,~~ of the pollination “service” by economists, in order to give a value and, as a result, a price to a natural function, questions the adaptability of the law. There is a great temptation to classify this service within a known category in order to benefit from a tried and tested regime ~~plan~~, such as accession, the fruit of the labors of the appropriated bees. However, if the work of the possessor is the basis for their ownership of fruits, the beekeeper cannot claim rights on what results from the labor of bees. He can only claim rights on the labor itself, that of the bees whose labor he exploits, and his own labor, linked to maintaining his colonies and the handling of his hives. This industry certainly has a heritage value, but it is not a good that can be owned.

2. A necessary coviability

The initial autonomy of pollination is followed by a necessary mutualism, supported by a strong anthropization: pollination now has a price and several costs. It has become a ‘service’, which gives rise to commercial exchanges: the price of making available insects due to the costs incurred for this purpose; the price of the provision of food resources for pollinators by the allocation of agricultural surface areas for purposes other than agricultural production, and the implementation of alternative techniques, with uncertain productivity levels. These costs must be seen in relative terms and must be related to the costs of the disappearance of these insects. These costs are individual for farmers whose crops depend on pollinators, when they need to offset the service deficit by a massive importation of pollinators; ~~they~~ these costs become collective when ~~of~~ the consequences of the reduction or even disappearance of the service could affect an entire ~~entire~~ human community. Paradoxically, the collectivity becomes dependent on farmers whose activities and growing methods account for a significant proportion of *Colony Collapse Disorder.* Communities have to help farmers to maintain bee colonies and their services, while the damages caused by their production activities to a collective service could have justified obliging them to meet the costs of their protection instead of turning it into gain (Weber, 2012).

The pollination service illustrates how the economy has appropriated nature. Henceforth, this appropriation imposes a value on ~~to~~ a biological function, which until now has always been free of charge. We have since become aware of the cost of its possible disappearance. The premise on which payments for eco-systemic services are based is rather sobering and serves to reinforce the reasons to protect suppliers. At any cost.