

## **Retuning mind in the Garden of Gaia. Neuropsychological aspects of the transnational ecocrime.**

The ongoing process of globalization has made the crime a major actor in the international relations. Criminal structures, as an entity of a relationship comprising the entirety of social relations, occupy an increasingly important place among the sources of contemporary threats. Murder, extortion, human and drug trafficking, the spread of corruption, the generation of ethnic tensions, relationships with policy makers and ultimately the impact on key decisions taken within the country - are just some of the items in a wide range of negative effects of organized crime. In the face of ongoing spontaneous development of social networks and technological interdependence as well as excellent financial resources remaining at the disposal of the criminal groups, further escalate of their activities is expected. As self-learning organizations having their own know-how, they submit their tactic of the constant revision, in order to appropriate and destabilize of subsequent areas of reality. Thus, they need a constant supply of new members, both in the context of improving control methods collaterally developed by the competent services, and also the competition between the same groups. It seems that in the creation process of potential criminals an important role play the neurochemical factors, embedded in a broader social and environmental context. Some of them are the result of large-scale industrial production, the others interact with the human body as a result of criminal activity in the natural environment. Interdisciplinary approach presented below does not belong to the canon of science of international relations, however, it seems to introduce a new quality to it, as "many aspects of globalization is still very controversial, both in terms of comprehension the concept of globalization, the description of the phenomena associated with this process, the nature of contemporary globalization, as well as the assessment of the effects of globalization"<sup>1</sup>.

In the modern world there are many sources that shape the psyche of the potential members of criminal groups. At a basic level, their origins can be traced to pathological socialization within the malfunctioning of primary and secondary social groups often involved in criminal dealings, as well as the internalization of abnormal patterns of personality, which dazzle the media and the social surroundings of the individual. Antisocial personality is shaped by the impact of previous

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<sup>1</sup> Liberska, Barbara (2002) "Współczesne procesy globalizacji gospodarki światowej" [In:] Liberska, Barbara (ed.), *Globalizacja. Mechanizmy i wyzwania*, Warszawa: PWE; p. 17.

traumas, also by the desire to achieve gratification at the lack of extrapolation skills, whether the implementation of an ad-hoc plan to increase an economic position in a manner inconsistent with the law is another cause of this type of behavior. However, due to the tactics of fulfilling and synchronizing of the organized criminal activities mentioned above, the current remains the question of intentional disturbing the living conditions of the community, shaping - in a more or less deliberate ways - circumstances stimulating of the new sociopaths and their subsequent assimilation into illegal structures. To demonstrate this mechanism, the neuropsychological aspects of criminal activity targeting ecosystems should be examined, and the same as an ecological aggression and as a variant of the ecocrime will be determined by introducing the concept of "neurocrime". As a crime against individuals committed at the molecular level, neurocrime (neurological crime) becomes a special, although hitherto little recognized, threat generated by a non-state actor. It threatens the safety of the individual and the social order, affecting the political system in a broader perspective.

To present the nature of this relationship, it is essential to use the scientific output of neuropsychology, understood here as "the description and interpretation of the relationship between the structure and function of the brain and the development, as well as the course and organization of mental processes"<sup>2</sup> In turn, presentation of the neurotoxic role of xenobiotics in the formation of character disorders will refer to the results derived from the mainstream of environmental and behavioral toxicology, molecular neurobiology as well as neurochemistry. Crime against the environment (ecocrime) is understood in the following text as "illegal acts which directly harm the environment"<sup>3</sup> and its scope applies both to the illegal dumping of toxic waste, exploitation of forest resources, mineral deposits and fisheries, as well as the trade of protected species of animals, transfer of banned chemicals and turnover on the global market of stolen timber. Due to the need for performing operations on the multiple levels, its transnational variant involves the social structure and the administrative institution of the state, bringing billions of dollars of profits annually to individuals entangled in this dealings; among whose are politicians, armed forces officials and NGOs. Due to its accompanying corruption and a small number of victims, ecocrime is still on the margins of interest of societies and governments.

Some of the elements mentioned above, exist in the study of international relations including the framework of the theories of R. Ullman, N. Myers, R. Kaplan, and P. Gleick. Canadian Thomas F. Homer-Dixon propounds dependency of the social and international conflicts from a transformation of the landscape. He argues that "environmental change may contribute to conflicts

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2 Kaczmarek, Bożydar L. J. (ed.) (2009) *Neuropsychologiczne uwarunkowania kontroli zachowania u dorosłych sprawców przestępstw*. Lublin: UMCS; p. 7.

3 Rice, Mary (ed.) (2008) *Environmental crime. A threat to our future*. London: EIA, p. 1. Accessed April 4, 2014. [http://www.unodc.org/documents/NGO/EIA\\_Ecocrime\\_report\\_0908\\_final\\_draft\\_low.pdf](http://www.unodc.org/documents/NGO/EIA_Ecocrime_report_0908_final_draft_low.pdf).

as diverse as war, terrorism or diplomatic and trade disputes"<sup>4</sup>. Since it is assumed that "it is possible talk of the environmental security of the international system of nation-states, and (...) of people (human security)"<sup>5</sup>, so on this background Homer-Dixon's model represents the threat to environmental safety at the macro level. It focuses on the role of environmental changes in the etiology of conflict at the individual, group and system level, in relation to the state of internal order and security of the international system. Therefore, at a local level it will be environmental degradation in the form of deforestation, the deficit and the pollution of farmland or drinking water, as well as global climate change; which all lead to migrations, conflicts over natural resources and ethnic fightings. An example of international conflict on the availability of natural resources, on agricultural land in this case, is so-called 'football war' between Honduras and El Salvador in 1969. Dysfunctions within the ecosystems affect the social structure of the state and consequently the well-being of the individual, as there can be no human security in isolation from the environment, society, decision-making processes, demographic structure, legislation, effective administration and economic situation of the country. The functioning of a social group in a particular political surrounding also provides opportunities and ways to overcome the negative effects of environmental degradation. Homer-Dixon lists seven major problems that potentially lead to the conflicts in developing countries: the ozone hole, global warming, deforestation, degradation of agricultural land, pollution and over-exploitation of sources of drinking water, exposure to acid rain and depletion of fisheries. In fact, these all are actually risk areas relevant to many countries and closely associated with the climate change. Meanwhile, in the case of neurocrime we are dealing with an alternative level of analysis, although some effects remain the same. It is worth to take a closer look at this issue in the context of the activities of transnational criminal groups, especially that it also affects developed countries.

Contemporary neuropsychological research verify the hypothesis of the bipolar influence of organic and psychological factors on the human personality, proposing the assumption that "in all behavior or personality disorders operates an organic factor, and more specifically – cerebral"<sup>6</sup>. Thus, science research situates the causes of antisocial behavior on the brain – environment axis, expanding the generally accepted range of factors which contribute to the formation of social dysfunction. Dynamic approach in this field of neurology emphasizes the crucial role of

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4 Homer-Dixon, Thomas F. "On the treshold. Environmental changes as causes of acute conflict." [In:] *International Security*, Vol. 16, No. 2 (Fall, 1991); p. 77. Accessed April 4, 2014. <http://www.jstor.org/stable/2539061>.

5 Barnett, Jon (2007) 'Environmental security', [In:] Collins, Alan (ed.) *Contemporary security studies*. New York: Oxford University Press; p. 197.

6 Herzyk, Anna, Paweł Krukow (2009) 'Organizacja strukturalno-funkcjonalna mózgu w regulacji procesów psychicznych oraz ich zaburzenia w postaci zachowań agresywnych.' [In:] Kaczmarek, Bożydar L. J. (ed.) (2009) *op. cit.*; p. 13.

environment in the shaping of neural networks and accentuates the influence of the subtle external factors in the process of formation of functional brain aberrations. Using scientific achievements in many fields of science, neuropsychology evolves towards a holistic approach that allows to exceed previous limitations, resulting from the separation and competitiveness of individual approaches of research. As such, it fits perfectly into the current issues of political science, explaining the questions of pathologization of power and social relations.

Anatomical areas of the brain associated with the formation of antisocial personality and the generation of aggression (impulsive and instrumental) are mostly the following centers of the limbic system: thalamus, hypothalamus, hippocampus, amygdala and cortex in the temporal lobes. They are involved in the reception of external stimuli, regulation of affect, generating and interpreting emotions, they act as circuit inhibiting and modulating aggressive behavior. The prefrontal cortex and orbitofrontal cortex in the frontal lobes with the serotonin as a neurotransmitter play a leading role in the control of behavior. The analysis of the phenomenon of impact ecocrime on the human security falls to begin with the presentation of the effects of toxins on the brain limbic structures, which organize the individual's attitude towards the demands of the social group, including giving rise to its ability to control the affection and respect of standards in the process of social functioning. Dysfunction of the frontal lobes lead to a lack of focus on interpersonal relationships, mood disorders resulting in aggression and impulsive action, to outer containment<sup>7</sup>, learned helplessness and defects in one's self-esteem. Inability to reflect and predict the effects of actions and stereotypization of daily activity complements the above image. Moreover, these anatomical structures constitute the psychic structure, as "anatomically, the core of the self is associated with supraorbital cortex and ventromedial prefrontal cortex"<sup>8</sup>.

A study by Adrian Raine, conducted among people affected by antisocial personality disorder shows that among the examined occurs 18% volume reduction of the middle frontal gyrus, and 9% reduction of orbital frontal gyrus. Subsequent studies confirmed that psychopaths have a thinner outer shell of the amygdala, and the same *corpus amygdaloideum* is smaller by an average of 18% in relation to the brains of the control group<sup>9</sup>. In addition, Raine's research "confirms improper construction of the gray matter of the frontal lobes in a group of killers"<sup>10</sup>. It turns out that the reason for this state of affairs does not lie exclusively in the area of genetic disorders and dysfunctions of development, but it is the result of the impact of xenobiotic compounds.

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7 In W. Reckless' sense of this term.

8 Northoff, Georg, Felix Bempohl (2009) "Kora mózgowa a jaźń." [In:] Jodzio, Krzysztof (ed.) *Neuropsychologia. Współczesne kierunki badań*, Warszawa: PWN; p. 169.

9 Moskowitz, Clara (2011) "Criminal Minds Are Different From Yours, Brain Scans Reveal." Accessed April 4, 2014. <http://www.livescience.com/13083-criminals-brain-neuroscience-ethics.html>.

10 Herzyk, Anna, Paweł Krukow (2009) *op. cit.*; p. 23.

The interdependence of the brain and environmental toxicology notes, inter alia, Herbert Needleman, who conducted studies indicating the correlation between increased concentrations of lead and criminal activities (apart from factors of a social nature)<sup>11</sup>. On the other hand, Roger D. Masters in his article<sup>12</sup> describes the positive impact of absorption of the lead from the environment on the occurrence of behavioral disorders, decreased intellectual capacity and the emergence of criminal tendencies. His hypothesis concerning neurotoxicological causes of violent crime, based on the appreciation of the impact of environmental degradation and organism exposure to heavy metals, especially lead and manganese. Their oversized presence in the body leads to uncontrolled bursts of aggression, indicating a negative influence of these metals on the frontal lobes of the brain. Another factor increasing the risk of uncontrolled aggression is associated with excessive alcohol consumption, pollution. Alcohol itself is indeed the cause of cerebral metabolism and structural changes in the prefrontal cortex<sup>13</sup>. Masters notes that environmental pollution is a factor in the genesis of crime as important as a poverty<sup>14</sup>. Similar relationship of lead and crime indicates an article on autopsy of offenders, included in the magazine *Popular Mechanics* (1984), which pointed to the high levels of lead in their hair samples.

The impact of heavy metals and organometallic compounds on the structure of the limbic system, especially the hippocampus and amygdala, was described, among others, by R. Lathe, who presented the issue in the context of autism spectrum disorders (ASD). In addition to the aforementioned lead and manganese, he points that brain dysfunctions are caused by mercury and aluminum too. Organic tin compounds (organotins) - included in the polyurethane plastics, biocides, in wood preservatives, antioxidants and its use as additives in the production of rubber - cause damage to the limbic system and result in changes in behavior. Single high doses of the experimental trimethyltin (TMT) in test results in primates "bilateral neuronal loss in hippocampus and amygdala, with some damage to cortex and brainstem"<sup>15</sup>. The long-term impact of this compound harms hippocampus and dentate nucleus; tributyltin (TBT) is, in turn, swelling of the axons. Lathe also stresses that adopted lethal dose destroyed the same areas of the brain in humans, and also the cerebral cortex and cerebellum. In the behavior area, TMT impairs learning ability,

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11 Needleman, Herbert L. *et al.* (1996) "Bone Lead Levels and Delinquent Behavior." [In:] *Journal of the American Medical Association* Vol. 275 No. 5 (February 7); 363-369.

12 Masters, Roger D. (2003) "The social implications of neuroscience. Linking brain biochemistry and violent crime." [In:] Bloom, Richard W., Nancy Dess (ed.), *Evolutionary psychology and violence. A primer for policymakers and public policy advocates*, Westport: Praeger; 23-56. Accessed April 4, 2014. <http://dianabuckland.webs.com/Div%20Added%20Files/Fluoride%20&%20Aggression/1%20PROF.%20ROGER%20MASTERS%20pdf%20-Social%20ImplicationsNeur43-1.pdf>.

13 Kaczmarek, Bożydar L. J. (2009) "Mózg społeczny." [In:] Kaczmarek, Bożydar L. J. (ed.) *op. cit.*; p. 29.

14 Phillips, Peter (ed.) (1999) *Censored 1999: The news that didn't make the news*. New York: Seven Stories Press; p. 121-122. Accessed April 4, 2014. <http://books.google.pl>.

15 Lathe, Richard (2006) *Autism, brain and environment*. London: Jessica Kingsley Pub; p. 99.

causes hyperactivity and aggression. "It is well known in the toxicological field that a combination of toxins can cause significant damage even when each is at subthreshold"<sup>16</sup>, Lathe writes.

Dependings noticed above have significant implications for the dynamics of criminal structures. First of all, is necessary to distinguish the level of security continuum in which that problem is manifested in a specific manner. That is, the already-mentioned, human security. Storage of hazardous substances is only a part of the broad issues of ecocrime and one of the potential sources of toxin emissions. As such, it represents a model or a reduction in the use of refine hypotheses about the molecular basis of expanding influence of organized crime. It should be noticed that the mere changes of direct human environment or the landscape, cause specific changes in behavior depend on the nature of the reorganization. On the basis of this knowledge, spatial modeling is used to shape architectural system in order to reduce crime trends among city residents<sup>17</sup>. So, if we can achieve the change of undesirable behavior through the manipulation of the urban buildings, similarly negative or positive effects will be created through the manipulation of natural ecosystems (forest, water, agroecosystem). In this context, the degradation of the landscape would be the most visible, macroscopic means of shaping the psyche of the individual in the direction of its pathologization (neurosis, depression, psychosis, etc.).

Meanwhile, the fundamental difference is on the level of interaction here, which in case of illegal dumping of toxic waste has a molecular dimension and is characterized by qualitatively different effects. The problem of waste disposal is growing, as the product life cycles are becoming shorter and manufacturing processes use complex chemical compounds with highly negative degree of impact on living organisms. Applicable rules are often a fiction in the face of enormous profits derived from the illegal dumping of toxic rubbish: "Disposal of hazardous waste and issuing fake receipts confirming recycling bring tens of millions of income"<sup>18</sup>. This practice has a great future because we can not expect any changes in the technological production processes and waste disposal without the introduction of appropriate legal regulations, just as it is not possible to use the letter of the law in a corrupt administrative system. The scale of the problem is significant and as such generates a sequence of impacts on the environment, which in turn leads to the multi-faceted effects of biological, social and political nature. They are reflected at every level of the systems analysis proposed by Homer-Dixon, but their causes lie not only at the macrolevel of the biosphere,

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<sup>16</sup> *Ibid.*; p. 115.

<sup>17</sup> Crowe, Timothy D. (2000) *Crime prevention through environmental design. Applications of architectural design and space management concepts*. Louisville: Butterworth-Heinemann. Crowe, Timothy D., Diane L. Zahm (1994) *Crime prevention through environmental design*, „Land Development” Fall 1994; 22-27. Accessed April 4, 2014. [http://www.popcenter.org/Responses/closing\\_streets/PDFs/Crowe\\_Zahm\\_1994.pdf](http://www.popcenter.org/Responses/closing_streets/PDFs/Crowe_Zahm_1994.pdf).

<sup>18</sup> Kittel, Bertold (2013) *System. Jak mafia zarabia na śmieciach*, Warszawa: PWN. Accessed April 4, 2014. <http://conowegowpwn.blogspot.com/2013/08/zapowiedz-system-jak-mafia-zarabia-na.html>.

but at the molecular level. It should be added that the territorial scope of the microinteractions is difficult to estimate and depends on the nature of the hazardous substance and route of its delivery into the body, likewise the nature of all environmental variables conducive to intoxication. Therefore, proposed model approach focuses therefore not on the range but on the mechanism, leaving previous issue to the neuropsychology and the toxicology, both question of the updating of a set of harmful xenobiotics, as well as an assessment of their measurable impact on criminal motivations.

According to the adopted assumption, the illegal exploitation of natural resources and disposal of toxic waste contribute to the progressive changes in the surroundings of the communities living in the degraded area. Deprivation of aesthetic and biological values in the macroscale leads to a lower standard of living, through the loss of potential economic opportunities associated even if the tourist attractiveness of the area, the availability of arable land and the outflow of the local population and the withdrawal of capital that generates employment. Unemployment, lack of prospects and relative deprivation distorted view of reality, forming the basis to pathological relationships under conditions of progressive poverty, depression, neurodegenerative and psychotic disorders. In parallel, the plunder of natural resources occurs as well as taking actions which allow the criminals to survive in adverse conditions. This is an essential phase, where emerge new potential members of organized crime groups, or where are created another structures representing their interests. The ability to exert pressure on governments, or the actual exercise of power by local warlords – in conjunction with their business connections – results in the transfer of the interests of criminal groups on the political plane, where other criminal structures, which are often the cause of degradation, are functioning. In this way, if it did not already take place before, there occurs the fusion and strengthening and extending the influence of criminal groups for the subsequent areas of life. Finally, environmental degradation and erosion of social structures, as well as proceeds of crime lobby are reflected at the international level, where the scale of corruption and links with transnational crime allow to reap considerable profits from criminal activity. As the state does not operate in a geopolitical vacuum, international tensions are only a matter of time. Just mention about the deficits of natural resources (forests, drinking water, farmland, fossil fuels) or civil wars spread on the neighboring countries, about which moreover says Homer-Dixon.

There remains a question of discrete interactions at the molecular level - significant here is the fact of the transfer of harmful exogenous xenobiotics to ecosystems. They degenerate brain tissue of individuals and lead to the deepening collapse of the threatened communities. Body

poisoning by xenobiotics<sup>19</sup> leads to the loss of ability to regulate and control behavior, which means deep pathologizing perspective of social relations in the contaminated area, leading to mental illness and antisocial behavior. In the longer term, neurodegenerative processes cause diseases such as aphasia and dementia, and exposure to toxins leads to negative reproductive and developmental effects in the population living in the area which is the source of particle emissions. In such a weakened social structure criminals operate much more efficiently. It seems that this sequence captures the essence of the impact of criminal activity on the molecular modification of the personality in the direction of antisocial behavior. The field of that impact relates to the neurological aspects, and this area remains closely linked to the crime against the environment, situating the issue at the point of contact between ecological safety and neuropsychology.

Transfer of the xenobiotics to the human body follows both in non food way: "toxicants usually penetrate into the atmosphere by evaporation, the solids are in the following adsorption geosphere and hydrosphere - through solution"<sup>20</sup>, and via the food chain. It should be noted that it is rather a long-term process and the occurrence of the described effects does not occur rapidly, but it is spread out in time, except in cases of placing in the ecosystem an extremely reactive substance. Sources of the toxic emission are wastes containing compounds released gradually in a process of interaction with the environment. In particular post-production chemical, but also lubricants, solvents, paints, oils and electrochemical cells. The latter group includes compounds impairing nervous system - polychlorinated biphenyls (PCBs). This is a carcinogenic compound used as a dielectric in the manufacture of transformers and high-power capacitors, forming part of the plastics, sealers, lubricants, hydraulic fluids and inks. Prohibited in the United States since 1977 it is still legal in Europe, however, used only under the strict supervision. The costs of disposal and scale applications of these derivatives of biphenyl preclude effective control of waste containing it: "Today, no one is able to determine the amount of transformers and capacitors which continue to work with synthetic PCBs oils as well as an scrapped devices and often user, unaware of the presence of PCBs, treats them as mineral oils"<sup>21</sup>. The compound penetrates the soil together with oils or with leakage from the worn transformers without earlier process of decontamination. Its ability to penetration of ecosystems is significant, as well as the resistance to degradation. Stacked in living organisms, they pass through the food chain to the last link, a man. It is an excellent example of the ease of illegal distribution of xenobiotics in the natural environment.

Other toxins causing mental changes, contained in the municipal and industrial waste

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19 Ball, Stefan (2003) *Chemia szarych komórek - neurochemia i toksykologia ośrodkowego układu nerwowego*. Warszawa: Medyk.

20 Manahan, Stanley E. (2006) *Toksykologia środowiska. Aspekty chemiczne i biochemiczne*. Warszawa: PWN; p. 128.

21 Beran, Elżbieta "Dotychczasowe działania w zakresie ochrony krajowego środowiska naturalnego przed skażeniem polichlorowanymi bifenylami." Accessed April 4, 2014. [http://www.pcb.pl/pcb\\_beran.shtml](http://www.pcb.pl/pcb_beran.shtml).



include: dust and vapor of chromium, mercury, soluble barium compounds, salts of silver and carbon disulfide. Special problem is a medical residues containing chemical or microbiological factors, which are worsening the processes in the limbic system, such as arsenic compounds and radioactive waste. Exposure to these compounds is not incidental, as indicates the example of Italy, where municipal or industrial waste, in the documents delivered to the designated landfill, are thrown into the caves, rivers or lakes"<sup>22</sup>.

However, the impact of crime on each of the conflicting aspects of the influence of environmental degradation seems to be clear on the macroscale, the current remains the question of change of the ecosystem in the microscale in the phase preceding the occurrence of pathology, violence and conflict. At this stage, it is assumed that described cerebral and mental phenomena are a side effect of a cynical, inconsiderate placement of toxic waste by those who apply this practice. It is too early to talk about the intentional impact of criminal groups on the personality, through the manipulation of the natural environment in the direction of creating a criminogenic matrix. Even if so far there is no clear evidence of such motivation, there are no obstacles if action of this type becomes in the future a tool of deliberate destabilization of the social situation, as an expression and proof of adaptation of criminals to adverse functioning conditions. Perhaps, even using the current achievements in the field of brain chemistry. Prospective evidence can then provide just neuropsychology, environmental toxicology and geography of the crime<sup>23</sup>. Results of Needleman's and Masters' experiments quoted above, as well as the contribution of other researchers are an excellent starting point for the verification of this thesis.

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22 Kondraciuk, Jolanta (2007) "Kalkuta w Neapolu." [In:] *Wprost* Nr 23 (1276). Accessed April 4, 2014. <http://www.wprost.pl/ar/107683/Kalkuta-w-Neapolu/?pg=1>.

23 Weisburd, David, Wim Bernasco, Gerben Bruinsma (eds.) (2009) *Putting crime in its place. Units of analysis in geographic criminology*. New York: Springer.