

System behaviour of water and environmental law

Sandor FULOP¹

¹ Public Service University, Faculty of Water Sciences, Department of Water and Environmental Policy, H-1083 Budapest, Ludovika tér 2. (e-mail: sandor@emla.hu)

DOI:10.59258/hk.17078



Abstract

Rules and procedures of mechanical things might be revealed by a piece by piece, linear analysis, while large unorganised masses can be approached by means of statistics. However, there is a vast middle layer of entities with complex structure and hardly calculable non-linear procedures that offer themselves for system science. System thinking makes possible that we understand wicked problems, perfect storms and other similar phenomena that otherwise resist the old, positivist, silo-thinking. In these cases, we learn that elements of a system form structures, develop procedures through which they together produce such results that could have been unimaginable solely by the elements alone.

Is it possible that with the help of system thinking we will be able to better grasp the essence of laws, moreover, we can design and implement laws with higher effectiveness? Is law a system? Or rather a complex tiered system of sub-systems, embedded into larger social-economic systems? In order to test these questions we analyse two intriguing sets of legal problems, to learn if we can describe and interpret them as systems that are – like systems generally – protecting their integrity with accommodation and resilience. The first example is the development of the segment of water laws that regulates drilling of small size wells for farms, where we see a 140 years process of gradual, more and more successful accommodation to the double social needs of protecting the interests of small farmers and sustainable development in respect to underground waters. This system resisted successfully an abrupt change that would have not fit to its goals. The second example is climate law as such – a relatively new development in the short history of modern environmental law, which can be hardly called a success story, because of the stiff resilience of the relevant branches of law. Indeed, resilience of law, as a complex, flexible and effective system does not always work according to our wishes.

Keywords

System thinking, emergent features, accommodation, resilience, legal systems, water law, small wells, environmental law, climate law, energy law.

A víz- és környezetjog rendszer viselkedése

Kivonat

A mechanikus dolgok sajátosságait megismerhetjük az elemeik részletes vizsgálatával, szisztematikus elemzéssel, lineáris logikával. A nagy, de szervezetlen tömegeket statisztikai módszerekkel kutatjuk. Van ugyanakkor a jelenségeknek egy nagy közbenső rétege, amit nehezen kiszámítható, nem-lineáris folyamatok jellemeznek. Ezeket legjobban a rendszertudományok segítségével értelmezhetjük. A rendszer megközelítés lehetővé teszi, hogy megoldjunk olyan komplex problémákat (wicked problems, perfect storms stb.), amik egyébként ellenállnak a hagyományos pozitivistá siló-gondolkodásnak. Feltárjuk, hogy a rendszer elemei hogyan szerveződnek struktúrákba, milyen folyamatokat alakítanak ki és együtt hogyan hoznak létre olyan eredményeket, amikre külön-külön az elemeik képtelenek lennének.

Lehetséges, hogy rendszer elemzéssel képesek lehetünk a jog lényegének jobb megértésére, sőt hatékonyabb jogszabályokat tudunk alkotni és eredményesebben alkalmazhatjuk azokat? A jog is egy rendszer? Vagy még inkább alrendszerek egymásra épülő rendszere, ami maga is beágyazódik nagyobb társadalmi-gazdasági rendszerekbe? Avégett, hogy ezeket a hipotéziseket ellenőrizhessük, két jelentős konkrét jogi problémát vizsgálunk meg és megkíséreljük őket rendszertudományi fogalmi keretben értelmezni, különösen azért, mert szembevetően őrzik a rendszerük integritását, ellenállnak a külső változtatási törekvéseknek. Az első példa a vízjog egy részének, a kis kapacitású mezőgazdasági kutak létesítésével kapcsolatos szabályoknak mintegy 140 éves organikus fejlődése. A jogterület fokozatosan alkalmazkodott a helyi agrárérdekek és a felszín alatti vizek fenntartható kezelésének kettős feladatához, viszont figyelemre méltó sikerrel ellenállt egy hirtelen, rendszer-idegen változtatásnak. A másik példában a klímajognak, ennek a viszonylag új jogágazatnak a fejlődését elemezzük, ami közelről sem nevezhető sikertörténetnek, éppen azért, mert a vonatkozó jogforrások rendszere szívósan ellenáll a változtatásnak. Azt találjuk, hogy a jog, mint összetett, rugalmas rendszer képes megőrizni az integritását, akkor is, ha ennek nem mindig örülünk. Ennek megértéséből, felhasználásából ugyanakkor talán új megközelítések, hatékonyabb jogfejlesztési, jogalkalmazási stratégiák is következhetnek.

Kulcsszavak

Rendszer megközelítés, emergens tulajdonságok, alkalmazkodás, ellenállás, jogi rendszerek, vízjog, kisméretű kutak szabályozása, környezetvédelmi jog, klímajog, energia jog.

SYSTEM THINKING: FOCUSING ON STRUCTURE, PROCEDURES, AND EMERGENT FEATURES

Theories of science establish the existence of a scientific topic when it has a clear-cut, generally agreed definition.

In the case of systems science, we might observe that the three basic elements of systems are consequentially mentioned in various sources, together or separately, mostly in a concise, aphoristic manner:

- Complex systems are ones in which the properties of the system are difficult to infer from the properties of the parts.
- Complexity comprised of dynamic relationships rather than the sum of segmented parts.
- An organization is best understood and improved if all parts of the system — people, procedures, norms, culture, technology, infrastructure, and outcomes — are understood as relational and interdependent parts of a complex system.
- Systems of law can be described as a collection of elements and — crucially — the connections between and among them (*Ahlström 2021, Klonick 2023*).

From other sources we can add some more:

- A systemic view embraces the idea that a system is a set of interconnected parts that, over time, produce a unique pattern of behaviour.
- According to systemic view the performance of the whole cannot be reduced to the performance of the individual parts.
- Emergent properties of an entity are properties possessed only by the entity, not by any of its components or by the simple aggregation of the components (*Heijden 2020*).

This line of opinions can convince us that system science has arrived at the core definition and at a generally shared understanding of the concept of systems. It does not change this statement that instead of 'structure' and 'procedure' some authors use 'patterns' and 'interrelationships' (*Freeman et al. 2014*), which fully cover the basic twin concept in system sciences. Furthermore, Donella Meadows, one of the leading representatives of system sciences uses the terms 'stocks' and 'flow', which I think are closely related terms, as well (*Meadows 2008*). Possibly, coming from the more cybernetics-oriented school of Jay Forrester, Meadows opted for terms that are easier handled by mathematical equations.

We can conclude that the basic tenet of system thinking is that in a system certain elements get together, they interact, and their continuous or regular flow of information will build up regular paths that solidify in a structure. The structure, in turn, will make some procedures easier or preferential. This way *structure* and *procedure* mutually determine each other, and they represent the central terms of system thinking. Structures can be hierarchical, cyclical and, most importantly, they can take a form of a grid, or network, with nodes, where several parts of the structure meet.

A system, furthermore, will produce some new qualities the elements in themselves could not. We call these new qualities *emergent features*. These products, results or events are readily observable in connection with the operation of a system. However, like the large, submerged base of an iceberg, patterns of the structures and procedures that give rise to them are not always as perceptible as the emergent features themselves (*Pierson-Brown 2020*).

As follows from the three basic parts of its definition, system thinking means a holistic evaluation (we call systemic) of the whole, rather than just a systematic, piecemeal examination of the elements. Such a complex approach allows for deeper understanding and more efficient management of several natural and social phenomena. However, it is up to us, which parts of reality we are willing or able to encompass.

Boundaries of the systems

In studying systems, one of the first tasks we must cope is to determine a reasonable scope of our examination, namely with delineating what shall constitute a system for us and what shall remain outside our scrutiny as the outer environment for our system. Usually our means, goals or expectations from the system determine our selection of the boundaries (*Meadows 2008*).

Surfacing is a related discipline. While universal connectivity is a central tenet of systems thinking, when it comes to system recognition, the goal is not to identify the infinite breadth of connectivity. Surfacing involves raising one's conscious awareness of a discrete set of structures responsible for a behaviour or outcome of interest. Setting boundaries moderates the set of elements at play, focuses the scope of our problem, in the same time it defines the context and highlights the outside connections that might be important for the observer (*Pierson-Brown 2020*).

Examples of system approach from all walks of life

System thinking can better explain a line of dynamic non-linear behaviours, complex socio-economic problems from cognition to social networks. The literature offers a very colourful collection of practical (and sometimes less practical, but very spectacular) examples:

- the ocean and the waves
- the forest and the trees
- predator-prey relationships and changes in population
- market reactions to new product introductions
- inventory oscillations in supply chain management
- instability in some developing countries
- the failure of drinking water systems in Togo
- the rationale behind John Hinckley's attempted assassination of President Reagan
- apparently self-destructive behaviour and provocative actions of extremist groups
- the failure of research in motion to remain competitive in the Smart Phone industry
- the community platforms on the Internet a „global online speech controlled and governed by private platforms”
- why many well-intended systematic and reductionist optimisations of regulatory systems such as for instance marijuana laws often do not achieve their desired results (*Heijden 2020, Klonick 2023, Monat and Gallon 2015*).

Types of systems

We might see some merits in dividing the multitude of systems according to several viewpoints. Quite obviously, they can be big or small, the scale of a system may range

from extensive *global systems* (such as, the global financial system) to much *smaller systems* (such as the supply of electricity to customers within a community network or down to the microscopic world) (*De Sousa 2020*).

There is a classification of systems that closely relates to the previous topic, recognising or setting the boundaries of our examination. In certain cases, these boundaries are quite rigid, in other cases more flexible. Based on their interrelations with their environment, *closed systems* are systems in which no elements enter or leave the system – this might be an extreme case or even only theoretical. Most living systems, such as society and its (sub)systems, are *open systems* i.e. systems where there is a flow or exchange of several elements, resources, information etc. between the system and its environment (*Heijden 2020*).

A further important grouping of systems is a division of *human made vs. natural systems*. The latter category encompasses living ones, such as plant and animal species and their groups (colony, pack, herd – we have amazingly long list of names for the same phenomenon: group of animals following a pattern of behaviour different from that of the individual animals) and non-living systems. In some systems the non-living systems serve as the habitats of living systems, while in the case of soil, for instance, the living systems represent a specific part of a complex system of mixed type. Human made systems might also be non-living, such as *technological systems* (e.g. systems that transform, transport, store or control materials, energy, or information) and *socio-economic systems* comprising people, institutions, elements of culture, practices, and services (*De Sousa 2020*).

From the above groups, naturally, systems of *humans or of human groups* deserve special attention. Reflexivity of humans and the different worldviews (their unique personality and the way they perceive themselves and their relations with other persons and with their circumstances) might make it difficult to understand these so-called *soft systems*, let alone to predict their behaviour (*Heijden 2020*). Even if so, system structures, procedures and behaviour are not totally altered in such systems, either. Moreover, system thinking will not model individuals, but rather handle empirical quantities that are associated with aggregates of individual behaviours (e.g. market confidence). This is not yet the abstraction level of statistics, but way beyond the individual specialities, therefore it belongs to the realm of system science.

Methodological differences in understanding and managing systems might make sense to forming further groups of systems. Here we can differentiate *complicated vs. complex systems*. A complicated system has many elements and procedures, but the parts and their interactions are calculable, predictable. In such complicated systems causes and effects operate mostly linearly. In the complex systems, though, there are many unknown, incalculable elements and procedures, often non-linear, and they are, therefore, less manageable (*Meadows 2008*).

These different categories of systems are overlapping, naturally, but these most certainly countable types of

systems encourage us to examine the systems' behaviour in more depth.

Protection of the integrity of systems: adaptation and resilience

If we consider the system as an organised unit in its environment, we will see that it strives to maintain its borders and internal composition through *adaptation*. In case an outside force threatens with intrusion or an inside force with rebellion, the active set of responses from the system might be called *resilience*. Adaptation seems to be forward looking, an action directed by the system as such, resilience might be rather an answer to a challenge. They are usually not rigid procedures; systems are likely to be in a state of *dynamic equilibrium*. A system can always move or be pushed out of balance, factors within or outside the system sometimes may affect the overall behaviour of the system in an unexpected way. In other words, systems often show *nonlinear* behaviour in which a small change in initial conditions can lead to a radical change in a later state of the system or, inversely, a large change in initial conditions might not lead to any significant change in later states of the system (*Heijden 2020*).

Integrity of the systems is ensured by their self-producing, autonomous, and self-referential nature that is called *autopoietic*. Through autopoiesis durable systems can keep internal mutations and external enactments at bay (*Heijden 2020*). We can add that the autopoietic systems maintain a delicate balance between openness and closeness in order to protect and develop themselves (*Faragó 2017*).

The most important tools a system achieves and maintains its integrity with, are the different internal procedures we call feedback. The *balancing or stabilising feedback* (also referred to as negative feedback) mechanism aims to direct the system towards equilibrium by correcting imbalances. Just to bring an example of social level regulatory system that many authors use: if the level (stock) of infringement of the laws and regulations at a certain field of administration grows (flow), the regulatory agency may provide feedback, such as more and more careful inspections and more severe punishments for those found in non-compliance. The *reinforcing or amplifying feedback* (also referred to as positive feedback) can be shown in a related example from the same administrative system. Once the members of the regulated community perceive rare and lenient enforcement actions, most of them will spare the compliance-costs (in Heijden's words: „a sector may result in firms seeking to cut corners”). Other role-players in the given sector will experience that, probably as an unfair competition and will have to infringe the law themselves, too, pushing the system out of its original equilibrium (*Heijden 2020*). Positive and negative feedback loops exist together. In the above example, some of the firms might start experiencing the initial turn in the policy of the administrative authorities and change their behaviour for better, while others still happily wade into the swamp of non-compliance. Positive and negative feedback loops can be quite complicated, going through a line of internal stations (stops, perceptions, evaluations, decisions etc.) and this

way they form a complicated pattern in most systems. That will create unforeseen effects and delays following (we avoid here the expression „resulting in”) any of the internal and external effects exerted on the system.

People on the regulatory side might see this complexity as a terrible disorder, a kind of policy resistance that should be broken down with even stronger measures. *Freeman* cites *Sterman* „Our decisions provoke reactions we did not foresee. Today’s solutions become tomorrow’s problems. The result is *policy resistance*, the tendency for interventions to be defeated by the response of the system to the intervention itself.” *Freeman* refers to California’s failed electricity reforms, and road building programs that led to increased traffic congestion, and another generally cited example, the evolution of antibiotic-resistant pathogens owing to stronger and stronger healthcare measures. These are all the same from system science viewpoints: ‘At the root of this phenomenon lies *the narrow, event-oriented, reductionist worldview* most people live by... There are no side effects – only effects. Those we thought of in advance, the ones we like, we call the main, or intended, effects, and take credit for them. The ones we didn’t anticipate we might account to policy resistance (*Freeman et al. 2014*).

Systems are in a state of constant change. A forest, for instance, typically goes through cycles of growth, collapse, regeneration, and new growth. In the early part of the cycle’s growth phase, the number of species and of individual plants and animals increases quickly, as organisms arrive to exploit all available ecological niches. The forest’s components become more linked to one another, enhancing the ecosystem’s „connectedness” and multiplying the ways the forest regulates itself and maintains its stability. However, the forest’s very connectedness and efficiency eventually reduce its capacity to cope with severe outside shocks, paving the way for a collapse and eventual regeneration (*Green 2016*). We might notice that this evaluation of a forest history depends on our scope of vision again: if we consider the forest and its environmental resources a system, we will not see circularity, just simple feedback mechanisms.

Changing the systems

Why lasting change on a system is so difficult to effect? Structural resilience is a system’s ability to survive and persist within a variable environment. However, while relatively stable, systems are adaptable and can be changed – depending on the weight, or consequence of that outside force. Leverage (opportunities to intervene in and disrupt systemic outcomes) can be created in several ways. *Donella Meadows* in her famous book has set 12 levels of leverage tools, organised into an order of their expectable effectiveness (*Meadows 2008*). At the beginning of this line, we find changing the elements of a system that can possibly alter what the system produces, but often systems stay intact even after a full turnover in their elements. Systems can dramatically change, however, by reorganising their structures, while it usually demands big investment. Systemic outcomes can also be affected by altering procedures, or quality of the connections (e.g. information channels) between the elements. Whenever the intervention is

not significant or consequential, the system may prove resistant to reforming efforts. Changing the goals and values that underlie the formation of a structure is perhaps the most impactful, as well as the most elusive means of effecting systemic change, because it leaves the work of actual changes on the system itself.

Generally, we must be careful not to hurry with our evaluation that a system is capable for changing or not. The system will work through our interference. It needs time to observe or perceive the effects of the complex effects of balancing or reinforcing feedback. Urgent and forceful effects can cause overreaction, while influences that last too long can be ignored in favour of more immediate stimuli (*Meadows 2008, Pierson-Brown 2020*).

In complex systems, a significant change results from the interplay of many diverse and apparently unrelated factors. Those of us engaged in seeking change need to identify which elements are important and understand how they interact instead. A good example of long-range systemic work is education. Raising a child is iterative, an endless testing of assumptions about right and wrong, a constant adaptation to the evolving nature of the child and his or her relationship with their parents and others. This example highlights the importance of time and application of the proper attitudes (*Green 2016*).

Attitudes when working with systems

All these features of system behaviour teach regulators on cautiousness and patience (*Meadows 2008*). Such situations require an *increased tolerance of failure*, continuous feedback on effectiveness, and a *willingness to foster diversity and innovation* (*Freeman et al. 2014*). The so-called *wicked problems* that allude our regular, linear way of thinking, are best resolved through a planned process with input from multiple sources in an atmosphere where scientific certainty is tempered by the perspectives of community stakeholders (*Töpfler et al. 2011*). Therefore, system planning, influencing, managing complex systems cannot be managed in one step, it is an *iterative, tiered* procedure, where the actors shall stop time to time, consult as much as possible and see what the possible next steps (*Green 2016*) could be.

The unavoidable uncertainty of system thinking is usually handled by system modelling that enables several rounds and versions of „what-if analyses” and designing a line of potential interventions through scenario analysis using the known rules of endogeneity, positive and negative feedback, delays, and mutual causality (*Freeman et al. 2014*). From communication science approach, the possibility of such remote, abstract way of handling of serious life and social-political problems reminds us to the basic function of languages. From this angle, system thinking might be called as a future, second language of humankind that will allow us brave imaginations about our environment and development paths without having to try all of them. This way, system thinking, similarly to the great invention of languages, can help humans to experiment without pain and exchange their results quickly and effectively. No doubt, system thinking has the capacity significantly transform human thinking and communication.

IS LAW A SYSTEM?

Bertalanffy (1968) argued that the ideas about the basic operation principles of natural organisms could be extended to complex systems of any kind. The relationship between structure and behaviour observed in organic systems, like cells and ecosystems, could also be observed in human social systems. Therefore, the methodology of understanding and managing such more complicated systems will follow the same logic as in the case of simpler systems (*Bertalanffy 1968, quoted by Heijden, 2020*). Naturally, systems are themselves organised in larger systems, where at upper layers there appear usually more and more complex, therefore newer, and newer emergent qualities. This means that while we accept the general system nature of such complex social systems as governance and law, we observe the differences, too.

Indeed, law is a very complex, hierarchical system, where we have the choice of at least four levels of systems for our investigation. (1) Even a single piece of legislation shows the basic system features: elements (people, organisations, territories, situations belonging to the scope of regulation, legal orders, sanctions etc.), their structures (persons and institutions of legal subjects, their rights, and responsibilities) and procedures (inherent or explicit procedural rules, mostly of feed-back nature, such as monitoring and enforcement). (2) Certain legislative goals are usually served by a set of laws, for instance a parliamentary act (determining the basic functions and tasks), a governmental decree (focussing on principles, scopes of authority and many other issues) and a ministerial decree (containing the technical details). (3) A branch of law (water management law, water protection law, environmental law, construction laws etc.) will also behave as a system, with added financial, institutional, educational, and socio-cultural elements. (4) The whole legal system (named this way, not by chance) will form a coherent system, too, with constitutions as a major goal setting and structure determining element, with legal principles and with rich international legal connections (which we might call level 5). Furthermore, we need to signal that law is inherently part of the larger system of governance and administration (level 6). Many of the system features, especially the emergent features of one certain level of law can be realised most clearly with the help of examination taking place on one or two levels higher.

Some scholars, whom we can strongly agree, argue that for effective legislation and successful legal practice an inherent (instinctive) or explicit system thinking is indispensable. One cannot understand an area of law from just reading a single provision of law not even a single judge's opinion in a case. Moreover, to really understand how legislation operates as a system, one must pay attention to many of the social, economic, and political structures, institutions, and organizations with which it interacts, which we called level 6 in our above description (*Pierson-Brown 2020*).

Nevertheless, this system approach breaks through with difficulties in our inherently linear way of thinking, especially in social sciences. Heijden, who made an exhaustive survey on the intersection of system sciences and

law, had to establish: „we have little evidence that thinking in systems will improve regulatory performance” (*Heijden 2020*). Other scholars are even more sceptical. *Vinuales*, for instance, doubts that the environmental laws and policies of, say, the United Kingdom, Japan, South Africa, or Brazil have any specific coherence or systematicity (*Vinuales 2023*). This latter comment in the field of comparative environmental law can also be an argument for the other side, though. It would be hardly possible to compare several laws or legal branches of several countries of quite different history and legal culture, unless there are systemic backbones in all of them, ensuing from their identical social functions and roles.

Interestingly, debate on the system nature of law had had a long history that started way before the tenets of system sciences crystallized.

Law as purpose, law as tool: acceptance and denial of its system nature

Acknowledgement and almost a sheer denial of integrity of law were both present in the history of thinking about the nature and essence of law. *Kjaer (2022)* has an elegant analysis of the development of social functions and scientific understanding of law. He establishes that in the 19th century and especially in the German Historical School legal scholars observed law as a coherent and rational system, where norms fit and support each other. Moreover, according to them, law is built up largely on its own basis and not on external moral, political, religious, or other factors. As they put: „the law became an end in itself”, in the sense that the content of law emerges from „the people” and is a faithful reflection of „society” rather than of „state”. This concept was closely related to a line of important achievements of social sciences and movements of the Enlightenment, starting from the division of powers and a strict formal equality of all persons, in a perfectly legally regulated society. Understanding law as a purpose enhanced the progressive liberal ideas of a democratic state and promoted a neutral public bureaucracy after the dark age of arbitrariness of kings and their local and regional lords.

In the first half of the 20th century, though, law was rather understood as a tool for accomplishing ideological projects, i.e. legal scholars started to deny its independent system nature. This idea came from both the extreme right and extreme left, or later, even from the welfare society – on a formal level, all the three ideological streams have embarrassingly similar concept of the social-political nature of law. Notably, the differences and ramifications of the two approaches have formed the central part of the famous Schmitt-Kelsen debate, too (*Baume 2009, Scholz-Karl 2021*). This way the winning concepts of „law as a tool” seemed to prevail all over the world, up until in the 70ies, when the neoliberal wave of „law as an obstacle” has swept them all away (*Kjaer 2022*).

From system science approach, we need to observe, first, that such historical analyses are unavoidably linear, they have difficulties in revealing the parallel and circular processes and the surviving or recurrent effects of past events. For us, law as a system that strives to maintain its

integrity and protects its borders, structures, and procedures, is not a historical momentum, but rather a steady element of the definition of law. However, it might be true, that under several socio-political constellations, integrity of law as a system might work better, while in other times it might give up easier for myopic intrusions from here-and-now political forces. We will see, however, from our two case studies below that, even if environmental law counts to be a brand-new branch of our legal systems and it was formed quite consciously by the realisation of the emerging system of ecological catastrophes, we might call a „voluntarist intrusion into the organic development of law”, it has considerable integrity. For the sake of simplicity, we use here the term „environmental law” as a branch of closely related administrative laws, such as nature protection, water protection, water management, landscape, land and soil protection, animal protection and many others. This new-born environmental law fiercely fights against newer interferences that it senses „system alien”. Environmentalists and those who are anxious about the future of our civilisation are happy to see when the system of environmental law resists direct economic or political actions that would harm its integrity, especially its long-term goals. On the other hand, as we will see sadly from our second example, environmental law resists the progressive changes, too, if they overlook its system nature and are introduced too hastily.

Progressive or destructive resilience of law

It is a question therefore, if the resilience of the environmental law stems merely from the system nature of law, i.e. it is mostly *value neutral*, or we can expect that the positive changes will be better supported by this kind of system operation. Some of the already existing elements of environmental law indeed, might predetermine a better capability of receiving progressive new impetus. The Rio principles of sustainable development that soon turned out mandatory legal principles in our legal systems, might play a key role in ensuring such positive protection.

Unfortunately, however, at the time being the list of examples of the „negative resilience” of the environmental law systems seems to be much longer than that of the positive examples. Just to mention a few: hopeless fight against city noise and air pollution – „Cleaner Air for Europe” Directive does not seem successful if we consider that almost all Member States have been subjects to infringement procedure; critical waste management problems stay unsolved – implementation of the Environmental Liability Directive is mostly ineffective (*Fulop 2021*); climate law is just in its *nasciturus* phase in Europe and elsewhere and we see no major effects of it on the key policies of the states, such as energy, transport, mining or agriculture (*Fülöp 2023*).

Even though the presumed autonomy and objectivity of law has long been debunked, most traditional legal education courses continue to promote the view that law is a distinct and a self-contained logical system. For a traditionally trained legal scholar, most solutions for any social problems start and end with law. If a certain law’s objectives are not achieved, the instinct is to seek explanations

for the failure either in the rule making or in the interpretation and application of the rules. However, expanding the scope of examination provides a wider context in which legal rules are made, applied, and contested. By examining law through social-economic sciences, sociology, anthropology, political science, amongst others, one can assess what law can and cannot do, no matter how „perfectly” designed it is. In certain cases, the influence of authoritarian political culture is the most viable explanation for why the declared progressive goals of laws will not fulfil, whereas fundamental rights of people are routinely overlooked or violated without redress. Such cases indicate that the basic assumptions of classic rule-of-law concepts, such as the primacy of the basic legal principles and human rights, do not fully hold. Taken an example from cultural anthropology research, in several developing countries officers in the environmental protection agency responsible for the enforcement of anti-pollution regulations are reluctant to enforce the law when the violation is caused by a government entity, and when confronted with that by outside researchers, they are indignantly saying that the government cannot sanction the government (*Hanschel et al. 2022*).

EXAMPLE 1: WATER MANAGEMENT SYSTEM DEFENDS ITSELF FROM NEW LAW ALLOWING UNCONTROLLED DEEP DRILLING OF SMALL-SCALE AGRICULTURAL WELLS

Wells serving the needs of households and surrounding smaller agricultural wells represented a steady legal-political dilemma in the last two centuries. As a rule in the history, while left wing, liberal governments favoured city population, right wing governments kept relying on the countryside dwellers and tried to support their strives (*Cribb 2019*). In all cases, however, reasonable water management regimes tried to balance between these political drives and the sustainable use of underground waters, representing larger and larger value, as surface waters become less reliable because of overuse, pollution and changing climate. Roughly, these factors have been strongly influencing the behaviour of the system of water management law relating to small agricultural wells.

Directions of legal regulation on the control of small agricultural wells

The nineteenth century water law stipulated that „new well in the villages and in their populated surroundings shall be drilled at least 3 meters away from existing other water sources, such as wells, lakes, springs or channels, while in the central parts of the villages this distance shall be 15 meters”. Those wells shall be limited to the regular needs of local life.

After the long life first water act, the 1964 communist Water Act established a stringent general permitting procedure, and exempted only those wells that did not reach further than the first water layer. After the change of regime, a 1992 Governmental Decree lightened the permitting responsibility with decentralizing it to the local notary. The newly established independent environmental inspectorate, as well as the water management directorate formally could have a say in these cases as co-authorities. [Governmental Decree No. 18/1992. (I. 28.)]. However,

this milder permitting regime related to all kinds of agricultural wells.

From 1996, the new Water Management Act and its executive decree narrowed the scope of authority of the municipality clerk to wells serving only domestic water needs. [Article 28 (1) of Act LVII of 1995., Article 24 (1) of Governmental Decree No. 72/1996. (V. 22.)].

A 2010 modification of the Water Management Act, turned into an overly liberal direction with establishing the category of „activities bound only to announcement to the authority” [A modified Article 28 (1) of the Water Management Act]. The environmental and water management authority could have the right to visit the site and monitor the

activity, while it was not realistic, considering the very limited capacity of this authority.

The modification of the Water Management Act in 2018 opened the way to a totally free drilling of small household wells in the country. The modification was explained by the minister forwarding the bill in more details: the goal of the government was to free from all permitting and announcement responsibility the small household wells which are shallower than 80 meter.

In the following chart (Figure 1.) we try to describe the one and a half century long development of the regulation of drilling wells for small countryside users.

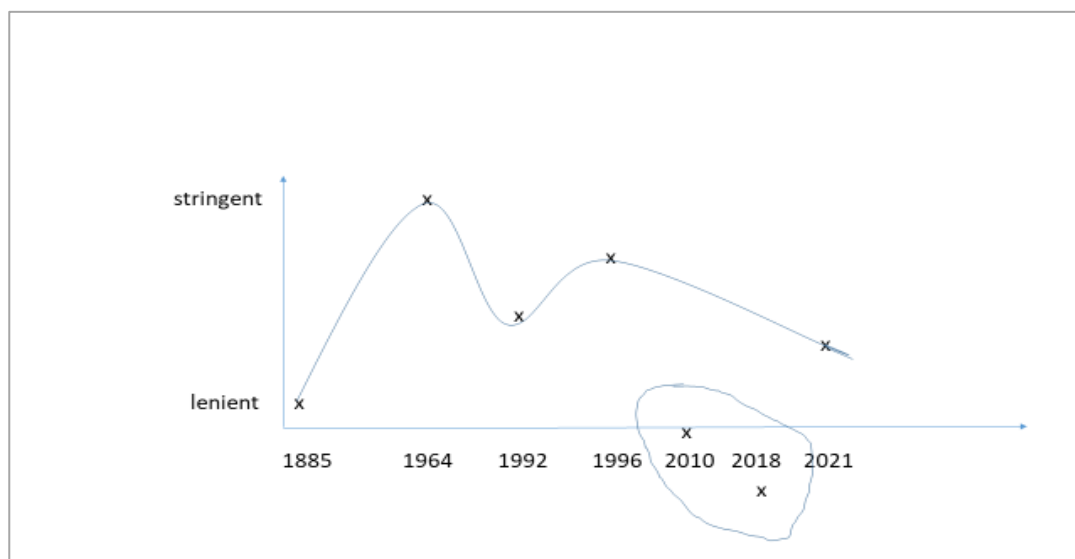


Figure 1. Development of the regulation of drilling wells for small countryside users (Edited by Author)
1. ábra. A kis kapacitású kutak létesítésének szabályozása (Saját szerkesztés)

Until 1996 we see a normal accommodation history of the system, through which it continuously refined its effectiveness in fulfilling its double goals: sustainability and the interests of small farmers (we show it on the stringent-lenient axis). The earlier stage of system development in 1885 started from a lenient position, but in the second step in 1964, it used a strong feedback mechanism in an attempt of establishing a new equilibrium with the other goal, sustainability (and a strong state control of the activities of the small farmers). In 1992 and 1996, thereafter, we see two quick fine-tuning efforts, also with the help of harnessing the experiences from the practical implementation of the water laws, and further amending its provisions (clearly recognizable feedback mechanisms). However, in 2010 and 2018 this accommodation mechanism was broken by a forceful outside impetus, arbitrarily overlooking the system balance. Yet, in 2018 a very important thing happened: the water management legal system started to defend its integrity (and maintaining its positions serving the original goals of water management in the field of groundwater management and support of smallholders in the countryside). This is what we called resilience in the system science introduction part above, to make a difference from the similar „peace time” integrity manoeuvres of accommodation. Let us see the (almost fully) successful resilience efforts of the water management legal system!

The role of non-governmental state institutions in resilience of water and environmental laws

In the matter of small agricultural wells, the President's Office was who formally turned to the Constitutional Court asking it to repel the modification of the Water Management Act. The main argument of the president was a major procedural concern about the preparation of the Act: no *strategic environmental assessment* (SEA) was performed, strikingly missing in such a legislation that undoubtedly exerts significant effects to the environment. Furthermore, the modification was contrary to some leading principles of sustainable development, environmental law and in general and rule of law: the *precautionary principle and the non-retrogression principle*. The president's proposal to the Court explained that the stake is high, because 94% of drinking water supply of the country comes from underground waters, while the quality of these reservoirs is fragile, and a close inventory of their quantities is indispensable. Finally, the President's Office added a basic constitutional and civil law argument: underground waters are *exclusive State property* that cannot be left without supervision and control.

The president was not alone in the case. He consulted the Environmental Deputy Ombudsman, too, who forwarded his opinion to him. According to the Deputy Ombudsman, the planned measures of the Water Management

Act would have led to uncontrolled use of underground waters, endangering both quality and quantity of several layers of underground waters. Furthermore, the Deputy Ombudsman, who is officially called Advocate for the Future Generations referred to the fact that the proposal vastly overlooks the interests of the *future generations*.

The Hungarian Academy of Sciences contributed to the debate, too. According to the unified opinion of several chambers of the Academy, the planned legalisation would have led to several hundreds of thousands of unknown wells, whereas such situation would have seriously endangered nature and agriculture at large. The leading scientists referred to some structural interrelations, too: serious arguments against the modification could be found in the *National Environmental Program and in the National Agriculture Strategy*. Such way the opinion of the Academy further broadened the scope of examination and reinforced the system of legal arguments in the case.

It is important to mention that all these state organisations took into consideration the contribution of 11 independent networks of professional hydrology organisations, public health organisations, water engineers' chambers and civil environmental organisations. They all highlighted several practical aspects of the planned modification that all could have led to low quality, *unprofessional well drilling* and wasteful use of underground waters.

The Constitutional Court *repelled* the amendment of the Water Management Act, based on Article P and Article XXI of the Constitution and having taken into consideration of all these aspects raised by several stakeholders in the case. [*Decision No. 13/2018. (IX. 4.) AB.*]. The new text of the Water Management Act, following this procedure prescribes *preliminary announcement* and *water management authority consent* to every well serving agricultural purposes (of any size), with the exception of territories where such an activity would not endanger the quality and quantity of underground waters. In order to underpin the decision on the probability of endangerment the Government was called in the Act to prepare a national database and map on the sensitivity of underground waters. Apart from this the Act determined a line of conditions for giving such consent, including that the new wells do not disturb *protection zones* of drinking water reservoirs, karst waters and are not located on registered areas of soil or underground water pollution. Furthermore, such wells cannot be deeper than *50 meters* and cannot break through the *first water insulation* (clay, etc.) layer. We see therefore that the curve of *Figure 1* might turn back upward soon.

Conclusions of Example 1

We have introduced here a part of water law behaving as a resilient system. For a better interpretation of this situation we need to solve a couple of identification problems between general system science terminology and the legal and water management concepts in the actual case. To start with, we need to determine our scope of examination. As we have seen in the system science introduction part, the borders of a system will be determined primarily by the goal of our examination. In the present case, in order to

understand the whole procedure, we need to draw the borders of the system rather broad: apart from the water management law we have to take into consideration some social-political and institutional factors, too.

The historical goal was on one hand to support of drilling household and small farm agricultural wells, and on the other side such a fair, socially sensitive regulation should be harmonized with the sustainability of our underground water resources. These goals are both served by the provisions of Water Act, together with some adjoining governmental and ministerial decrees, legal practice, procedures, and institutions. At a certain point in the balanced operation of this double goal system, one of the goals (ensuring better position to small farmers) prevailed disproportionately, therefore a serial of negative feed-back mechanisms stepped into work. The system used institutions that are less obliged to the direct political agenda of the government, general principles of sustainable development and rule of law that seemed to be able to give bigger stress to the water security issues.

The institutional side of the case study deserves more attention: the narrower sense water management setting was enriched by a line of relevant institutions from the periphery of the system (or from neighbouring or superseded systems). They all sensed that one of the main goals in the system was endangered, therefore they moved towards the centre, and – as we expect from system elements – indulged into a concerted action.

These fringe authorities activated some important background materials for their purposes that all represented the approaches of larger, higher level systems: constitutional provisions, sustainable development principles, one specific environmental rule of law principle (non-retrogression) and a serial of principal, general professional arguments.

Active participation of the independent professional and environmental civic organisations signalled the importance of consultations, in system science terms, enhancing and activating procedures and communication between the elements of the system. The system, as a rule does not let its members fight alone, while the central elements of the system, where in trouble, do count on the support from otherwise passive elements. Consequently, public participation, as usual, had an important auxiliary role in this case (*Leroux-Martin and O'Connor 2017*).

EXAMPLE 2: ENVIRONMENTAL LAW SYSTEM DEFENDS ITSELF FROM NEW, MORE AMBITIOUS CLIMATE PROTECTION PLANS

The Hungarian Climate Act (*Act XLIV of 2020.*) is the leading piece of the branch of law that determines the most important goals of the system of climate law in the country. The first goal is stipulated broadly: mitigation of the emission of greenhouse gases and decreasing their presence in the environment with the help of sinks, mostly by restoring and expanding the forest coverage. The second large group of goals are connected to adaptation to climate change, prevention of damages in the environment and human health. These very general goals are broken down into more actionable parts by the second National Climate

Strategy [NÉS-2, endorsed by the Parliamentary Decision No. 23/2018. (X. 31.)]. This plan details the decarbonisation path of our society and economy, with some references to geo-storage of carbon-dioxide. On the accommodation side NÉS-2 gives examples of protection and restoration of the national resources, namely natural, human, and economic ones, plus preparation of flexible responses to climate change in all these three fields. Quite progressive elements of NÉS-2 are climate partnership (deliberative formation of climate policies by all the stakeholders), awareness raising and the positive exemplary behaviour of state organisations in the field of energy saving, climate-friendly public procurement, amongst others.

Immediately we can sense that these goals need a lot of efforts for being implemented in the practical life. We have seen that the first logical step of implementation of the general climate goals in the Climate Act has correctly happened through their development into a highly professional climate plan. The second indispensable step would be the creation of a system of likeminded sectoral plans,

which could carry the general climate protection and accommodation messages to all relevant branches of administration.

The Hungarian Institute of Social Reflection run an overall research in this field (Fulop 2022, Fulop and Szamek 2022). In the following table (Table 1.) I try to summarize the results in respect to the three major groups of relevant state plans, their climate relevant goals, legal and institutional tools, expected effects of the foreseen measures, as well as the fact if they use of the sustainable development principles or not, which is a major element of climate law systems that establish connections to social and economic sectors of our society. In the last column, most importantly, we exhibit the results of a piecemeal research effort about the fourth and most important step of fulfilling the goals of the Climate Act: namely that how many parliamentary acts, governmental or ministerial decrees refer concretely to these sectoral plans in their text as an indication of intents to further break down the general text of the plans into implementable or enforceable legal commitments.

Table 1. Characteristics of relevant state plans
1. táblázat. A vonatkozó állami tervek jellemzői

Plan	Climate relevant goals	Legal and institutional tools	Expected effects of	Use of SD principles	Source	Year	Refers
<i>A) General development plans</i>							
National Reform Program					Gov.	cont.	
National Development Concept					Parl.	2014	
Kárpát Home Development Concept					SRI.	2014	
Clean Development Strategy					Gov.	2021	
Just Transition Plan			nd.	nd.	Gov..	2021	
<i>B) Decarbonisation and energy plans</i>							
National Energy Strategy					Parl.	2011	
National Energy Efficiency Action Plan					Gov.	2015, 2017	
National Construction Energy Strategy					Gov.	2015	
Energy and Industry Development Action Plan					Gov.	2018	
National Hydrogen Strategy					Gov.	2021	
Energy and Climate Awareness Action Plan					Gov.	2015	
<i>C) Other sectoral plans</i>							
Transport Infrastructure Development Strategy					Gov.	2014	
Electro-mobility Plan					Gov.	2015, 2019	
Innovative Industry Development Plan					Gov.	2016	
National Countryside Development Strategy					Gov.	2012	
National Forest Strategy					Gov.	2016	
Biodiversity Strategy					Gov.	2015	
Environmental Technology Innovation Strategy					Gov.	2011	
National Landscape Strategy					Gov.	2016	
National Water Strategy					Gov.	2017	
National Security Strategy					Gov.	2012, 2020	
National Military Strategy					Gov.	2021	
Food-chain Safety Strategy					Gov.	2013	
National Tourism Development Strategy					Gov.	2017, 2020	
Environmental Technology Strategy					Gov.	2011	

Colour code: green: proper, yellow: just on the border of acceptability, red: not acceptable.

The content of the first column is somehow self-reinforcing: naturally, the climate protection goal appears in all the examined plans (actually, that was the leading viewpoint of their selection). On the other hand, these climate goals are mostly just very general ones, we could find only a fragment of goals set in the above general decisions (*Climate Act and NÉS-2*). In the second column we did not always find measures in harmony with the Climate Act and with the Second National Climate Protection Strategy, while seemingly the authors of these sectoral plans were familiar with their content. In the third column we were looking for the signs of foreseeable effectiveness of the examined plans in the legal practice. We counted a plan effective, where we detected the institutional and budgetary conditions of implementation, especially of the climate related sections. Furthermore, the professional quality of climate provisions would also raise the level of probability of their proper implementation. High professional quality, however, is hardly ensured without transparent and patient consultations with the concerned scientific, professional, and civic communities, which were seldom reported by the introductory parts of the sectoral plans.

Taking all of these, in the first three column, the quality of the plans relevant for climate protection seems to be of average level. In the fourth column, though, the situation worsens, while the fifth, last column shows much worse results. Practically no actual, detailed, directly implementable laws refer to these plans. Why? As if the fourth column contained a warning for this total ineffectiveness. That column examines the presence of sustainable development principles in the climate related plans – we found much less than expected. This is bad news, because sustainable development principles form the most basic bridges between scientifically well based, widely consented professional plans and their actual implementation. In other words, these principles contribute to the interconnections of the elements of the system of climate law. Without them, these connections are weak, as our findings reinforced this general statement. In addition to all of these, we have to notice that the otherwise progressive texts of these plans with climate relevance do not communicate with each other, they contain no cross-references, they do not use the same concepts, not even a harmonised set of terminology and sectoral principles.

We have a line of speculations about what might cause this total failure of our climate law, which is parallel to the respective failures of global, regional, national, community and individual level climate protection efforts. Paradoxically, accommodation, too, has serious deficiencies at all levels. One would think that once mitigation is totally ineffective, legal subjects will pay attention at least to accommodation as a second choice, but this is not the case.

Climate change is a system of global phenomena, so that we would need a harmonised set of actions from all levels that are closely interrelated and share destiny even they are not aware of that. Unfortunately, in the field of climate protection all stakeholders at all levels keep waiting for each other. Those participants of the game on the top levels, who are unable to pass the responsibility to

higher levels, are just simply paralysed, entangled in serious, unsolvable trap situations. Any governments or regional-international bodies that tried to install meaningful climate programs would lose their position within a blink of eye. The lethal paradigm of capitalism that forces everyone to grow (pay back bank interests etc. – this phenomenon has libraries full literature) would prevent the governments or large companies from any ‘suicidal’ restriction of producing capacities or their markets. They would risk losing the economic and political race. Once they try to conclude agreements to shrink their consumption and pollution in a concerted way, they just open the playing field for cheaters and free riders. Feed-back mechanisms such as IPCC (not without serious political and economic influences, though), WMO, UNEA, independent scholars, large networks and local cells of environmental protection civic organisations are at place but muted down by the cacophony of our communication systems (mass media, internet social network systems etc.). Perfect storm, wicked problems – we have the vocabulary to address these complex problems, the analyses of Oxford Martin School or the GFACT program of the World Future Council are really good examples. But most certainly a wide scale social and political understanding of climate change is still missing.

We cannot say, however, that some people do not try to move out the climate system from this stalemate. We have already hinted in connection with the previous example that instead of the paralyzed governments and administrative systems non-governmental state organisations, such as ombudspersons, presidential office (where they do not have direct governmental responsibilities), chambers of relevant professions undertake some role in climate protection. Courts in this group of institutions deserve special attention because of having the largest possible independence from the executive power in the modern states that still maintain the remainders of the idea of division of power. The so-called *court activism* might be a key element in the system of climate mitigation and resilience, together with the creative legal strategies of the NGOs or groups of citizens who start climate cases. Based on a Columbia University survey, the UN published some statistics that inform us that in the last 10-15 years on more than 60 domestic, regional, and international courts more than 2000 climate cases were heard – in most of the cases with relative successes. (*United Nations Environment Programme’s Global Climate Litigation Report 2023*). Enhanced role of the non-governmental state institutions are largely parallel to the case of Example 1 above.

BETTER UNDERSTANDING AND MANAGING ENVIRONMENTAL AND WATER MANAGEMENT LEGAL SYSTEMS

Law in general, but environmental law especially is an open system. Yet, the *borders* of several levels of legal systems are very important. They serve as means of differentiation and interconnection between different dimensions of politics, economy, and society. Since the end of the Medieval, this function is unchanged: to make social relationships calculable, to build mutual trust between people, groups and nations and defend the weak. This border-

ing and skeleton function is especially important in the Anthropocene World, where systems are more *interconnected* than ever. The current technological and social innovations, environmental-, socioeconomic-, and political feedbacks, such as financial crashes and disease outbreaks, propagate more quickly than in the past and with greater geographic spread (*Ahlström 2021*).

Certain *elements* of the legal systems behave as they told, others have more leeway to follow their own agendas (both authorities and clients have discretionary rights), while, until they are part of the rule of law system, their freedom is limited, too. Some elements, partly as a response to this flexible situation have monitoring, controlling functions, some of them undertake such functions voluntarily, as civil „watchdogs”. They are the non-governmental organisations and the local communities who have key roles in environmental protection, therefore they need reinforcement. Legal, procedural rules of public participation shall be user friendly and shall contain capacity building elements.

Structures, such as organisations and networks represent the most static parts of legal systems. Contrary to other social, natural or non-living systems, legal structures are historically built up, they can be changed only at a high price and difficulties. They shall be transparent and accountable in the face of the whole socio-political system. In our examples, the society need continuous *feedback* from the work of water and environmental law (transparency and accountability) and about the outcome of the operation of the system (sustainability monitoring). Poor level of ventilation of data and conclusions, as well as distorted communication might be very significant causes of inefficiency and failures of work of legal institutions.

The *procedures* and the directions of communication between the elements of legal system are typically hierarchically arranged, they mostly follow top-down or bottom-up patterns, but not always. Activities of non-governmental state bodies (ombudspersons, state auditing organisations, certain sections of prosecutors' offices etc.) and courts might (shall) be aligned with the local communities and non-governmental organisations. The non-governmental state bodies are less bond by the direct political-economic influences from the society and from the political sphere, while their constituency, source of important, independent information could be much widespread.

Social, political demands and orders towards law, especially water and environmental laws often can change quite abruptly. When decision-makers try to change a sector of law, they might set new or modified specific *goals* to them. Reformation of goals, in principle, might be the key leverage points of the legal systems: once the society and the economy changes, the political and legislative organisations sense the need to influence the social-economic procedures (as they always do), the most obvious first measure to take is to sentence new, modified goals to a given body of law. Once the new goals resonate with the given parts of the legal system, including the solid structures (institutions) and legal subjects that apply, implement, or enforce them, they will change the respective so-

cial-economic fields. However, when the changes in legislative goals are sensed arbitrary, premature or not organically fitting to the existing structures and procedures, the legal system will reject them. If the change is forceful enough, it might create brand new laws and establish brand new institutions to implement them, but then it will turn out that the system can change its borders, it can involve more and more peripheral elements and activate them to maintain or restore the previous equilibrium of the respective part of the legal system.

CLOSING REMARK

While there is a growing body of research about the interconnection between law and system science in general, the next logical step, namely application of system thinking in better understanding and resolving certain complex legal problems is still mostly ahead of us. I hope that this approach will prove itself fruitful in the future, while I do acknowledge that systematic (rather than systemic) analyses of the facts and their legal ramification will stay for long the main methodological tool for lawyers. The piecemeal examination of all the elements of legal system forms the bulk of work of theoretical and practicing lawyers, while, I am convinced, it will not hurt if they apply system thinking as an auxiliary methodology. Lawyers, indeed, are more similar to carpenters who are interested in the structure and applicability of individual pieces of wood. However, they might find it useful sometimes to talk to the foresters, too.

REFERENCES

- Ahlström, H. (2021)*. Systems Thinking and the Law in the Age of the Anthropocene, University of Oslo Faculty of Law Legal Studies, Research Paper Series No. 2021-20.
- Baume, S. (2009)*. On political theology: A controversy between Hans Kelsen and Carl Schmitt, History of European Ideas, Volume 35, Issue 3, 2009. pp. 369-381, ISSN 0191-6599. <https://doi.org/10.1016/j.histeuroideas.2009.01.001>
- Bertalanffy, L.von (1968)*. General System Theory: Foundations, Development, applications; George Braziller, New York 1968.
- Cribb, J. (2019)*. Food and Conflict: Premonitions: The Crimson Thread – Food Empires – Here Come the Long Ships – Food and the Rise of China – Food and India – Food and War – Fear of Famine. In Food or War (pp. 1-25). Cambridge: Cambridge University Press. <https://doi.org/10.1017/9781108690126.001>
- De Sousa, D. (1920)*. Systems Thinking: How can it be used to enhance regulation?, Dart Legal Consulting, Food for Thoughts section, available at: (<https://www.dartlegal.com.au/food-for-thought/systems-thinking>).
- Faragó, L. (2017)*. Autopoietikus (társadalmi) terek koncepciója = The concept of autopoietic (social) space. Tér és Társadalom, 31. (1). pp. 7-29. ISSN 2062-9923. <https://doi.org/10.17649/TET.31.1.2839>
- Freeman, R., Cherruault, J.-Y., Yearworth, M. (2014)*. Review of Literature on Systems Thinking and System Dynamics for Policy Making; a report Prepared for Department for Environment, Food and Rural Affairs in 2014.

Fülop, S. (2021). Improving implementation and the evidence base for the ELD, final report to the European Commission, 2021, Brussels, pp. 1-246. (<https://circabc.europa.eu/ui/group/3b48eff1-b955-423f-9086-0d85ad1c5879/library/ec101025-1121-4809-a1ace72a146fd20d/details?download=true>).

Fülop, S. (2022). A hazai klímavédelem és alkalmazkodás jogi keretei, Társadalmi Reflexió Intézet, Budapest. (<https://socialreflection.org/wp-content/uploads/2022/12/F%C3%BC1%C3%B6p-S%C3%A1ndor-A-hazai-kl%C3%ADmav%C3%A9delem-%C3%A9s-alkalmazkod%C3%A1s-jogi-keretei.pdf>).

Fülop S., Szamek G. (2022). A stratégiai szintű állami döntések vizsgálata, azok kikényszerítésének lehetőségei, Társadalmi Reflexió Intézet, Budapest. (<https://socialreflection.org/wp-content/uploads/2022/12/F%C3%BC1%C3%B6p-S%C3%A1ndor-E2%80%93-Szamek-Gabriella-A-strat%C3%A9giai-szint%C5%B1-%C3%A1llami-d%C3%B6nt%C3%A9sek-vizsg%C3%A1lata-azok-kik%C3%A9nyszer%C3%ADt%C3%A9s%C3%A9s%C3%A9nek-lehet%C5%91s%C3%A9gei.pdf>).

Fülop S. (2023). A klímaváltozáshoz történő alkalmazkodás és a klímavédelem joga (jogi szempontú értékelés nem csak jogászoknak), Környezeti Management és Jog Egyesület, Budapest, 2023. (https://justiceandenvironment.org/wp-content/uploads/2023/11/DACE_Hungary_legal-study-1.pdf)

Green, D. (2016). Systems Thinking Changes Everything. <https://doi.org/10.1093/ac-prof:oso/9780198785392.001.0001>

Hanschel, D., Aguilera Bravo, M.G., Dashpurev, B., Kedir Idris, A. (2022). Environmental Rights Between Constitutional Law and Local Context: Reflections on a Moving Target, German Law Journal (2022), 23, pp. 10121028. <https://doi.org/10.1017/glj.2022.68>

Heijden, J. van der (2020). Systems Thinking and Regulatory Governance: A Review of the International Academic Literature; SSRN Electronic Journal, January 2020.

Kjaer, P.F. (2022). What is Transformative Law? European Law Open, 1, 4, 760-780. <https://doi.org/10.1017/elo.2023.1>

Klonick, K. (2023). Of Systems Thinking and Straw Men, Harvard Law Review Forum, Vol. 136:339. <https://doi.org/10.2139/ssrn.4424585>

Leroux-Martin, P., O'Connor, V. (2017). Systems Thinking for Peacebuilding and Rule of Law; Supporting Complex Reforms in Conflict-Affected Environments, Peaceworks Publication.

Meadows, D.H. (2008). edited by Diana Wright: Thinking in Systems, Earthscan, 2008.

Monat, J.P., Gannon, T.F. (2015). What is Systems Thinking? A Review of Selected Literature Plus Recommendations, American Journal of Systems Science 2015, 4(1). pp. 11-26.

Pierson-Brown, T. (2020). (Systems) Thinking Like a Lawyer, 26 Clinical Law Review 515 (2020); also available at: (https://scholarship.law.pitt.edu/fac_articles/219).

Scholz-Karl, J. (2021). Behind the theoretical debate between Hans Kelsen and Carl Schmitt: the nineteenth century constitutionalism and German public law, UNIO - EU Law Journal. Vol. 7, No. 2, December 2021, pp 4-17. <https://doi.org/10.21814/unio.7.2.3101>

Töpfler, K, Meuleman, L., Bachmann, G., Jungcurt, S., Napolitano, J., Perez-Carmona, A., Schmidt, Falk (2011). Trans governance, the Quest for Governance of Sustainable Development, Institute for Advanced Sustainability Studies, Potsdam.

Vinuales, J. (2023). Comparing Environmental Law Systems, British Institute of International and Comparative Law

United Nations Environment Programme's Global Climate Litigation Report (2023).

https://wedocs.unep.org/bitstream/handle/20.500.11822/43008/global_climate_litigation_report_2023.pdf?sequence=3

AUTHOR



SANDOR FULOP Lawyer (ELTE, 1992), psychologist (ELTE, 1997), acquired his PhD in the Debrecen University (2011) from environmental procedural law. He is full time associate professor at the Public Service University, Budapest, teaching water and environmental law, international water diplomacy and communication sciences. Besides, he is a courtroom attorney at EMLA, a public interest environmental law firm. Served the Hungarian Parliament as ombudsman for future generations between 2008 and 2012.