

Wicked Problems

Subjects: **Others**

Contributor: samia sediri

Wicked problem thinking is regaining interest in different disciplines, mostly because of the complex and interdependent contemporary issues that are particularly challenging for policy makers. This type of problems is difficult, even impossible to tackle by defining optimal solutions because of both deep uncertainty and high complexity. The causes and effects of wicked problems are cross-scale and multi-level; they are extremely difficult to identify due to the system dynamics and non-linear interactions. Thus, most of these problems are symptoms of or related to other problems. Moreover, wicked problems are poorly formulated and boundary-spanning issues where involved stakeholders bring different perspectives to the definitions and potential resolution of the issue. Indeed, the wicked nature stems from biophysical and social complexity, where divergent values related to multi-stakeholders' perceptions and interests influence largely the problem-solving and determining desirable outcomes.

wicked problems

decision-making

social complexity

stakeholders

uncertainty

1. Introduction

The contemporary policy problems are complex and full of uncertainties; they involve interdependent structures, multiple actors, and strong societal implications. From local to global scale, these problems are associated with a resurgence of interest about the “wicked problems” thinking (See, e.g., [\[1\]\[2\]\[3\]\[4\]\[5\]\[6\]\[7\]\[8\]\[9\]\[10\]](#)). The concept of wicked problems stems from the systems theory and planning literature [\[11\]\[12\]](#); system thinking was developed to help in engaging with the overwhelming complexity of the real world [\[13\]\[14\]](#). The term of wicked problem was coined by Rittel and Webber in their seminal article “Dilemmas in a general theory of planning” [\[11\]](#). The concept was developed in order to describe the emergence of a set of intractable issues that defy the capacity of policy-makers and governments to address them properly [\[15\]](#). Churchman, defines a wicked problem as a “class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing” [\[12\]](#) (p. 141). At approximately the same time, system theorist R. Ackoff was discussing the notion of messy problems that defy technical solution [\[16\]\[17\]\[18\]](#). Another original work on policy problems was brought by Herbert Simon, [\[19\]](#), where he discussed the notion of ‘ill-structured’ problems and the inherent difficulties associated with problem-solving.

Wicked problems generally are ill-defined because their formulation already depends on the viewpoint of those presenting them [\[20\]](#), and each problem may be a symptom of other problems [\[11\]](#). Thereupon, providing a solution to one dimension of the problem may exacerbate situations by generating undesirable consequences. They are described as “wicked problems” to highlight their complexity and the difficulties they ensue [\[21\]\[22\]](#). Further, the formulation of the wicked problems and their solutions affect a wide range of stakeholders. Indeed, in a wicked

situation, there may be strong disagreement and opposing worldviews between stakeholders about the priorities and desired outcomes [23][24]. Political conflicts are also characterizing wicked problems [1][25].

In the context of global policy, issues such as poverty alleviation, natural resources management, security, have been described as wicked problems. The wicked problem perspective provides new insights concerning why many policies and programs fail to achieve their goals, have unforeseen effects, are difficult to coordinate and generate controversy and inaction [2][3][6][26][27][28]. In this line of thinking, climate change has been described as a 'super wicked problem' [29]. The super wicked problems are characterized by four additional key features: "time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address them is weak or non-existent; and irrational discounting occurs that pushes responses into the future" [30] (p. 124); see also [31].

2. What make problems wicked?

Wicked problems are complex, intractable, non-linear and open-ended; they are boundary-spanning issues. Wicked problems tend to emerge in highly interconnected social systems; they are characterized by interdependence and dispute [26][32][33]. They involve different stakeholders, who differ in their interpretations of the environment and their definition of problems; the strategies developed to solve them are also related to the perceptions they develop upon their life experiences [34]. In fact, the wicked problems perspective emphasizes the role of stakeholder perceptions, values and interests with differing values and perspectives, which leads to divergent framing of the problems [3][28]. As a result, there is no consensus on what exactly the problem is, neither a well-described set of solutions [23]. Therefore, the problem definition tends to change over time [11]. There is no right or definitive solution to wicked problems in complex systems, only trade-offs and responses negotiated between the involved stakeholders [27][35][36].

Rittel and Webber have defined the concept of wicked problems through ten primary characteristics [11] (see Box 1). Further, Alford and Head have described a continuum of problems ranged from taming to wicked problems, their works detailed features of wicked problems based on complexity and the difficulties related to institutions and the stakeholders' perceptions [26], while [32] provided explanations about the constraints that hamper understanding and solving wicked systems.

Box 1. Ten defining attributes of wicked problems, after Rittel and Webber [11]

1. There is no definitive formulation of a wicked problem
2. Wicked problems have no stopping rule
3. Solutions to wicked problems are not true or false, but good or bad

4. There is no immediate and no ultimate test of a solution to a wicked problem
5. Every solution is a “one-shot operation” and may have irreversible effects.
6. There is no established set of potential solutions
7. Every wicked problem is unique
8. Every wicked problem may be considered a symptom of another problem
9. Causes and effects of a wicked problem can be explained in numerous ways
10. In solving wicked problems, the planner has no right to be wrong, i.e., policymakers are liable for the consequences of the solutions, and the public have no tolerance or trust in initiatives that fail.

3. Dealing with wicked problems

[33][34] have pointed “stakeholder divergence, situational complexity and knowledge uncertainty” as key elements reinforcing the wickedness of a situation. Hence, they are extremely difficult to tackle using conventional approaches, such as “command and control” which ignores uncertainties and feedbacks [23][28][35][36]. Tackling the wicked challenges demand collaboration between scientific communities, experts and the society. Accordingly, wicked problems have been largely discussed in a perspective of a post-normal science (see, e.g., [23]). Post-normal science approach focus on issues characterized by irreducible complexity, deep uncertainties, a plurality of legitimate perspectives, value dispute, high stakes, and urgent decisions [37][38][39][40][41].

Moreover, Inter and transdisciplinary approaches are of interest due to the social relevance in facing wicked issues [35][42][43][44]. To create new knowledge, research process invites participants from a diverse of unrelated academic disciplines to transcend boundaries and cooperate with non-academic stakeholders [45][46][47]. Accordingly, [48] argued participatory approaches based on “collective learning, exploration, and experimentation” are appropriate for tackling wicked problems [48] (p. 2). For example, in sustainability issues, scholars have preconized “multi-actor networks and collaborative partnerships” to address wicked problems [49][50][51]. The participation of multiple actors is advocated because considering stakeholders views is thought to contribute to more detailed understanding of the situation and acceptable outcomes [10][42][49][52][53][54]. This could help design and implementation of effective policies by the participants, as [55], outlined, a solution to a wicked problem is up taken durably only if it is developed collectively by the affected parties. Further, in the context of wicked problems, governance approaches also may be mobilized (see, e.g., [6][56][57][58][59][60]).

4. Conclusions

Wicked problems are largely discussed in the recent literature about the policy sciences and environmental issues, the main challenge for decision-making is to recognize such type of problems and therefore, move from conventional rational-technical solutions to develop alternative approaches and thinking. Developing those solutions may be a long process, given the irreducible complexities arising from various forms of uncertainty and social dispute. Interdisciplinary and participatory approaches are advocated to deal with these intractable issues and address the related social conflicts. Further, future research is needed to explore wicked problems-solving using the Agent-Based Modelling (ABMs). ABMs ^[61] have been mobilized to help decision-making in situations of complex social stubborn problems, in medicine and public health (see, e.g., ^[62]^[63]).

The article is from [10.3390/su12155895](https://doi.org/10.3390/su12155895)

References

1. Peters, B.G. What Is so Wicked about Wicked Problems? A Conceptual Analysis and a Research Program. *Policy and Society* 2017, 36, 385–396, doi:10.1080/14494035.2017.1361633.
2. DeFries, R.; Nagendra, H. Ecosystem Management as a Wicked Problem. *Science* 2017, 356, 265–270, doi:10.1126/science.aal1950.
3. Head, B.W. Forty Years of Wicked Problems Literature: Forging Closer Links to Policy Studies. *Policy and Society* 2019, 38, 180–197, doi:10.1080/14494035.2018.1488797.
4. Termeer, C.; Dewulf, A.; Biesbroek, R. A Critical Assessment of the Wicked Problem Concept: Relevance and Usefulness for Policy Science and Practice. *Policy and Society* 2019, 38, 167–179, doi:10.1080/14494035.2019.1617971.
5. Colding, J.; Barthel, S.; Sörqvist, P. Wicked Problems of Smart Cities. *Smart Cities* 2019, 2, 512–521.
6. Sediri, S.; Trommetter, M.; Frascaria-Lacoste, N.; Fernández-Manjarrés, J. Transformability as a Wicked Problem: A Cautionary Tale? *Sustainability* 2020, 12, 5895.
7. Groeneveld, R.A. Welfare Economics and Wicked Problems in Coastal and Marine Governance. *Marine Policy* 2020, 117, 103945.
8. Fossum, J.E. Can Brexit Improve Our Understanding of “Wicked Problems”? Reflections on Policy and Political Order. *European Policy Analysis* 2019, 5, 99–116.
9. McConnell, A. Rethinking Wicked Problems as Political Problems and Policy Problems. *Policy & Politics* 2018, 46, 165–180.

10. Dentoni, D.; Bitzer, V.; Schouten, G. Harnessing Wicked Problems in Multi-Stakeholder Partnerships. *Journal of Business Ethics* 2018, 150, 333–356.
11. Rittel, H.W.J.; Webber, M.M. Dilemmas in a General Theory of Planning. *Policy Sciences* 1973, 4, 155–169, doi:10.1007/BF01405730.
12. Churchman, C.W. Guest Editorial: Wicked Problems. *Management Science* 1967, 14, B141–B142.
13. von Bertalanffy, L. General System Theory-A Critical Review, «General Systems», Vol. VII 1962.
14. Churchman, C.W. *The Systems Approach*; Delta, 1968;
15. Peters, B.G.; Tarpey, M. Are Wicked Problems Really so Wicked? Perceptions of Policy Problems. *Policy and Society* 2019, 38, 218–236.
16. Ackoff, R.L. Management Misinformation Systems. *Management Science* 1967, 14, B147–B156.
17. Ackoff, R.L. *Redesigning the Future: A System Approach to Societal Problems*; 1974;
18. Ackoff, R.L. Resurrecting the Future of Operational Research. *Journal of the operational research society* 1979, 30, 189–199.
19. Simon, H.A. The Structure of Ill Structured Problems. *Artificial intelligence* 1973, 4, 181–201.
20. Shindler, B.; Cramer, L.A. Shifting Public Values for Forest Management: Making Sense of Wicked Problems. *Western Journal of Applied Forestry* 1999, 14, 28–34, doi:10.1093/wjaf/14.1.28.
21. Grundmann, R. Climate Change as a Wicked Social Problem. *Nature geoscience* 2016, 9, 562–563.
22. Norton, B.G. The Ways of Wickedness: Analyzing Messiness with Messy Tools. *Journal of Agricultural and Environmental Ethics* 2012, 25, 447–465.
23. Batie, S.S. Wicked Problems and Applied Economics. *American Journal of Agricultural Economics* 2008, 90, 1176–1191, doi:10.1111/j.1467-8276.2008.01202.x.
24. Weber, E.P.; Khademian, A.M. Wicked Problems, Knowledge Challenges, and Collaborative Capacity Builders in Network Settings. *Public Administration Review* 2008, 68, 334–349, doi:10.1111/j.1540-6210.2007.00866.x.
25. Roberts, N. Wicked Problems and Network Approaches to Resolution. *International public management review* 2000, 1, 1–19.
26. Alford, J.; Head, B.W. Wicked and Less Wicked Problems: A Typology and a Contingency Framework. *Policy and Society* 2017, 36, 397–413, doi:10.1080/14494035.2017.1361634.

27. Game, E.T.; Meijaard, E.; Sheil, D.; McDonald-Madden, E. Conservation in a Wicked Complex World; Challenges and Solutions. *Conservation Letters* 2014, 7, 271–277, doi:10.1111/conl.12050.
28. Mason, T.H.E.; Pollard, C.R.J.; Chimalakonda, D.; Guerrero, A.M.; Kerr-Smith, C.; Milheiras, S.A.G.; Roberts, M.; Ngafack, P.R.; Bunnefeld, N. Wicked Conflict: Using Wicked Problem Thinking for Holistic Management of Conservation Conflict. *Conservation Letters* 2018, 11, e12460, doi:10.1111/conl.12460.
29. Lazarus, R.J. Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future. *Cornell L. Rev.* 2008, 94, 1153.
30. Levin, K.; Cashore, B.; Bernstein, S.; Auld, G. Overcoming the Tragedy of Super Wicked Problems: Constraining Our Future Selves to Ameliorate Global Climate Change. *Policy sciences* 2012, 45, 123–152.
31. Sun, J.; Yang, K. The Wicked Problem of Climate Change: A New Approach Based on Social Mess and Fragmentation. *Sustainability* 2016, 8, 1312.
32. Andersson, C.; Törnberg, P. Wickedness and the Anatomy of Complexity. *Futures* 2018, 95, 118–138, doi:10.1016/j.futures.2017.11.001
33. Head, B.W. Wicked Problems in Public Policy. *Public policy* 2008, 3, 101.
34. Head, B.W.; Alford, J. Wicked Problems: Implications for Public Policy and Management. *Administration & Society* 2015, 47, 711–739, doi:10.1177/0095399713481601.
35. Brown, V.A.; Harris, J.A.; Russell, J.Y. Tackling Wicked Problems through the Transdisciplinary Imagination; Earthscan, 2010; ISBN 1-84407-924-4.
36. Conklin, J. Wicked Problems & Social Complexity; CogNexus Institute San Francisco, CA, 2006.
37. Funtowicz, S.O.; Ravetz, J.R. Uncertainty and Quality in Science for Policy; Springer Science & Business Media, 1990; Vol. 15; ISBN 0-7923-0799-2.
38. Funtowicz, S.O.; Ravetz, J.R. A New Scientific Methodology for Global Environmental Issues. *Ecological economics: The science and management of sustainability* 1991, 10, 137.
39. Funtowicz, S.O.; Ravetz, J.R. Science for the Post-Normal Age. *Futures* 1993, 25, 739–755.
40. Funtowicz, S.; Ravetz, J.R. Emergent Complex Systems. *Futures* 1994, 26, 568–582.
41. Funtowicz, S.; Ravetz, J. Post-Normal Science. *International Society for Ecological Economics* (ed.), *Online Encyclopedia of Ecological Economics* at <http://www.ecoeco.org/publica/encyc.htm> 2003.
42. Head, B.W.; Xiang, W.-N. Why Is an APT Approach to Wicked Problems Important? *Landscape and Urban Planning* 2016, 154, 4–7.

43. Pohl, C.; Truffer, B.; Hirsch Hadorn, G. Addressing Wicked Problems through Transdisciplinary Research. *The Oxford handbook of interdisciplinarity* 2017, 319–331.
44. Hadorn, G.H.; Hoffmann-Riem, H.; Biber-Klemm, S.; Grossenbacher-Mansuy, W.; Joye, D.; Pohl, C.; Wiesmann, U.; Zemp, E. *Handbook of Transdisciplinary Research*; Springer, 2008; Vol. 10;.
45. Mauser, W.; Klepper, G.; Rice, M.; Schmalzbauer, B.S.; Hackmann, H.; Leemans, R.; Moore, H. *Transdisciplinary Global Change Research: The Co-Creation of Knowledge for Sustainability. Current Opinion in Environmental Sustainability* 2013, 5, 420–431.
46. Klein, J.T. Evaluation of Interdisciplinary and Transdisciplinary Research: A Literature Review. *American journal of preventive medicine* 2008, 35, S116–S123.
47. Norris, P.E.; O'Rourke, M.; Mayer, A.S.; Halvorsen, K.E. Managing the Wicked Problem of Transdisciplinary Team Formation in Socio-Ecological Systems. *Landscape and Urban Planning* 2016, 154, 115–122.
48. Xiang, W.N. Working with Wicked Problems in Socio-Ecological Systems: Awareness, Acceptance, and Adaptation. *Landscape and Urban Planning* 2013, 110, 1–4, doi:10.1016/j.landurbplan.2012.11.006.
49. Dentoni, D.; Bitzer, V. Dealing with Wicked Problems: Managing Corporate Social Responsibility through Multi-Stakeholder Initiatives. In *Proceedings of the Journal of Management Studies*
50. Hocking, V.T.; Brown, V.A.; Harris, J.A. Tackling Wicked Problems through Collective Design. *Intelligent Buildings International* 2016, 8, 24–36.
51. Tietjen, A.; Jørgensen, G. Translating a Wicked Problem: A Strategic Planning Approach to Rural Shrinkage in Denmark. *Landscape and Urban Planning* 2016, 154, 29–43.
52. Dentoni, D.; Hospes, O.; Ross, R.B. Managing Wicked Problems in Agribusiness: The Role of Multi-Stakeholder Engagements in Value Creation: Editor's Introduction. *International Food and Agribusiness Management Review* 2012, 15, 1–12.
53. Dentoni, D.; Bitzer, V. The Role (s) of Universities in Dealing with Global Wicked Problems through Multi-Stakeholder Initiatives. *Journal of Cleaner Production* 2015, 106, 68–78.
54. Elia, G.; Margherita, A. Can We Solve Wicked Problems? A Conceptual Framework and a Collective Intelligence System to Support Problem Analysis and Solution Design for Complex Social Issues. *Technological Forecasting and Social Change* 2018, 133, 279–286.
55. Parrott, L. The Modelling Spiral for Solving 'Wicked' Environmental Problems: Guidance for Stakeholder Involvement and Collaborative Model Development. *Methods in Ecology and Evolution* 2017, 8, 1005–1011.
56. Daviter, F. Coping, Taming or Solving: Alternative Approaches to the Governance of Wicked Problems. *Policy Studies* 2017, 38, 571–588.

57. Davison, A.; Patel, Z.; Greyling, S. Tackling Wicked Problems and Tricky Transitions: Change and Continuity in Cape Town's Environmental Policy Landscape. *Local Environment* 2016, 21, 1063–1081.
58. Termeer, C.J.; Dewulf, A.; Breeman, G.; Stiller, S.J. Governance Capabilities for Dealing Wisely with Wicked Problems. *Administration & Society* 2015, 47, 680–710.
59. Ansell, C. Collaborative Governance as Creative Problem-Solving. *Enhancing public innovation by transforming public governance* 2016, 35–53.
60. Sachs, S.; Rühli, E.; Meier, C. Stakeholder Governance as a Response to Wicked Issues. *Journal of business ethics* 2010, 96, 57–64.
61. DeAngelis, D.L.; Diaz, S.G. Decision-Making in Agent-Based Modeling: A Current Review and Future Prospectus. *Front. Ecol. Evol.* 2019, 6, doi:10.3389/fevo.2018.00237.
62. Rigotti, N.A.; Wallace, R.B. Using Agent-Based Models to Address “Wicked Problems” like Tobacco Use: A Report from the Institute of Medicine; American College of Physicians, 2015; ISBN 0003-4819.
63. Silverman, E.; Gostoli, U.; Picascia, S.; Almagor, J.; McCann, M.; Shaw, R.; Angione, C. Situating Agent-Based Modelling in Population Health Research. *arXiv preprint arXiv:2002.02345* 2020.

Retrieved from <https://encyclopedia.pub/entry/history/show/34528>