**A framework for conceptualizing leadership in conservation**

Seth A. Webb, Brett Bruyere, Matt Halladay and Sarah Walker

Table 1 List of leadership domains and practices referenced in each of the 59 articles identified. An inductive analysis approach was utilized to identify the leadership practices discussed in the articles, and then they were grouped based on similarities to construct the five domains.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Article** | **Leadership domains and practices** | | | | | | | | | | | | | | | | | | | |
|  | **Stakeholder Engagement** | Stakeholder Access | Communication | Conflict Management | Partners with Clear Roles | **Trust** | Knows Culture | Built Relationships | Exchange Knowledge | **Vision** | Clear Vision | Included Others in Vision | **Individual Champion** | Persisted Through Challenges | Unwavering Passion | Inspired Others | **Internal Excellence** | Internal Communication | See Issue at Different Scales | Adaptable |
| [Agyare et al. (2015)](#b1) | x |  |  | x |  | x | x |  | x |  |  |  | x | x |  |  |  |  |  |  |
| [Ardoin et al. (2015)](#b2) | x |  | x | x |  | x |  |  |  | x | x | x |  |  |  |  | x | x |  |  |
| [Bartlett (2018)](#b3) | x | x | x |  | x | x | x | x |  |  |  |  |  |  |  |  | x |  |  | x |
| [Black (2015)](#b4) |  |  |  |  |  |  |  |  |  | x | x | x |  |  |  |  |  |  |  |  |
| [Black & Groombridge (2010)](#b6) | x | x | x |  | x |  |  |  |  |  |  |  | x | x |  | x | x |  | x | x |
| [Black et al. (2011)](#b7) | x | x | x | x | x | x | x | x |  | x | x | x |  |  |  |  | x | x | x | x |
| [Blicharska & Rönnbäck (2018)](#b9) |  |  |  |  |  | x |  |  | x |  |  |  | x |  | x |  | x |  |  | x |
| [Blickley et al. (2013)](#b10) | x |  | x | x |  | x | x |  |  |  |  |  |  |  |  |  | x | x |  |  |
| [Bodin & Crona (2008)](#b11) | x |  |  | x |  | x | x | x | x |  |  |  | x |  |  |  | x | x |  |  |
|  | **Stakeholder Engagement** | Stakeholder Access | Communication | Conflict Management | Partners with Clear Roles | **Trust** | Knows Culture | Built Relationships | Exchange Knowledge | **Vision** | Clear Vision | Included Others in Vision | **Individual Champion** | Persisted Through Challenges | Unwavering Passion | Inspired Others | **Internal Excellence** | Internal Communication | See Issue at Different Scales | Adaptable |
| [Bruyere (2015)](#b13) | x |  |  | x | x |  |  |  |  | x | x | x |  |  |  |  | x | x | x | x |
| [Butler et al. (2015)](#b14) | x |  |  | x |  | x |  | x | x | x | x | x | x |  |  |  | x | x | x | x |
| [Case et al. (2015)](#b15) | x |  |  | x |  | x |  |  |  | x |  |  | x | x | x |  | x | x | x | x |
| [Christiansen & Belton (2017)](#b16) | x | x |  | x |  | x | x | x | x |  |  |  |  |  |  |  | x |  | x |  |
| [Clark et al. (2017)](#b17) | x |  | x |  | x | x |  | x |  |  |  |  |  |  |  |  | x |  | x |  |
| [Crees et al. (2016)](#b18) | x | x | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [Crona et al. (2017)](#b19) | x |  | x |  |  | x | x | x |  | x | x |  |  |  |  |  | x | x |  |  |
| [Davenport & Hassan (2019)](#b20) | x |  | x | x | x | x | x | x |  | x |  | x | x |  |  | x | x | x |  | x |
| [Dietz et al. (2004)](#b21) | x |  | x | x |  | x | x | x |  | x | x |  |  |  |  |  | x |  | x |  |
| [Diedrich et al. (2017)](#b22) | x | x |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [Dyer et al. (2014)](#b23) | x | x | x | x | x | x |  |  | x | x | x | x | x |  |  |  |  |  |  |  |
| [Englefield et al. (2019)](#b24) |  |  |  |  |  | x |  | x |  | x | x |  | x |  | x | x | x | x |  |  |
| [Evans et al. (2015)](#b25) | x |  |  | x |  | x |  |  |  | x | x | x |  |  |  |  | x |  | x | x |
| [Foster et al. (2011)](#b26) | x | x |  |  |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Stakeholder Engagement** | Stakeholder Access | Communication | Conflict Management | Partners with Clear Roles | **Trust** | Knows Culture | Built Relationships | Exchange Knowledge | **Vision** | Clear Vision | Included Others in Vision | **Individual Champion** | Persisted Through Challenges | Unwavering Passion | Inspired Others | **Internal Excellence** | Internal Communication | See Issue at Different Scales | Adaptable |
| [Game et al. (2014)](#b27) | x | x |  |  |  |  |  |  |  | x | x |  |  |  |  |  | x |  |  | x |
| [Giakoumi et al. (2018)](#b28) | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [Gruber (2010)](#b30) | x | x | x | x |  | x |  | x |  | x | x | x |  |  |  |  |  |  |  |  |
| [Gutièrrez et al. (2011)](#b31) | x |  | x | x |  | x |  |  |  |  |  |  | x | x | x |  |  |  |  |  |
| [Head et al. (2016)](#b32) | x |  |  |  |  | x |  |  |  |  |  |  | x |  |  |  | x |  |  | x |
| [Kenward et al. (2011)](#b35) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  | x |
| [Langholz & Abeles (2014)](#b37) | x |  | x | x |  | x |  |  |  | x | x |  |  |  |  |  |  |  |  |  |
| [Leahy & Anderson (2008)](#b38) | x |  |  |  |  | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| [Leisher et al. (2011)](#b39) |  |  |  |  |  |  |  |  |  | x |  |  | x | x |  |  |  |  |  |  |
| [Liu et al. (2008)](#b40) | x | x | x |  |  | x |  |  | x |  |  |  |  |  |  |  |  |  |  |  |
| [Lockwood et al. (2012)](#b41) | x | x |  | x |  | x |  | x | x | x | x | x |  |  |  |  | x |  |  | x |
| [Mannetti et al. (2015)](#b43) |  |  |  |  |  | x |  |  | x |  |  |  | x | x |  | x |  |  |  |  |
| [Manolis et al. (2009)](#b44) | x |  | x | x |  | x |  | x |  | x | x | x |  |  |  |  | x |  |  | x |
| [Martin et al. (2012)](#b45) |  |  |  |  |  |  |  |  |  | x | x |  | x | x | x | x |  |  |  |  |
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| [Mattson et al. (2011)](#b46) |  |  |  |  |  |  |  |  |  | x | x |  | x | x |  | x |  |  |  |  |
| [McGreavy et al. (2016)](#b47) | x | x | x | x | x |  |  |  |  | x | x | x | x | x |  | x |  |  |  |  |
| [McKiernan (2018)](#b48) |  |  |  |  |  | x | x | x | x |  |  |  | x |  | x | x |  |  |  |  |
| [Micheli & Niccolini (2013)](#b50) | x |  |  | x |  | x |  | x |  | x | x | x |  |  |  |  |  |  |  |  |
| [Mountjoy et al. (2014)](#b51) | x |  | x |  |  | x |  |  |  | x | x |  | x |  |  | x | x |  |  | x |
| [Pero & Smith (2008)](#b52) | x | x | x | x | x | x | x | x |  | x | x | x | x |  | x | x |  |  |  |  |
| [Scheele et al. (2018)](#b53) | x | x | x |  |  | x |  | x |  | x | x |  | x |  | x |  |  |  |  |  |
| [Sjolander et al. (2015)](#b54) | x |  | x |  |  | x | x | x | x | x |  |  |  |  |  |  |  |  |  |  |
| [Smith et al. (2007)](#b55) | x | x | x |  | x | x | x | x |  | x | x | x | x |  |  |  |  |  |  |  |
| [Stern & Predmore (2012)](#b57) | x | x | x | x | x |  |  |  |  | x | x | x | x | x |  |  | x | x |  |  |
| [Stöhr et al. (2014)](#b58) | x |  | x | x | x | x |  | x |  | x | x | x | x | x |  |  |  |  |  |  |
| [Straka et al. (2018)](#b59) | x |  | x |  | x |  |  |  |  | x | x | x | x | x |  | x |  |  |  |  |
| [Sudtongkong & Webb (2008)](#b60) | x | x | x | x | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [Sullivan & Syvertsen (2019)](#b61) |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  | x |  |  |  |  |
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| [Sutton (2015)](#b62) | x |  |  | x | x | x | x | x |  | x | x | x | x | x |  | x | x |  |  | x |
| [Sutton & Rudd (2016)](#b65) | x | x | x |  |  | x | x | x | x |  |  |  |  |  |  |  | x | x |  |  |
| [Sutton & Rudd (2015)](#b64) | x |  |  | x |  | x | x | x |  |  |  |  | x |  |  |  |  |  |  |  |
| [Sutton & Rudd (2014)](#b63) | x |  | x | x |  | x | x | x | x | x | x |  | x |  |  |  |  |  |  |  |
| [Trialfhianty & Suadi (2017)](#b67) |  |  |  |  |  | x | x | x | x |  |  |  |  |  |  |  |  |  |  |  |
| [Wallace (2003)](#b68) | x |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  | x |  |  | x |
| [Walters (2007)](#b69) |  |  |  |  |  |  |  |  |  |  |  |  | x | x | x | x |  |  |  |  |
| [Zulu (2008)](#b70) | x | x |  | x |  | x |  |  |  |  |  |  | x | x | x |  | x |  |  | x |
| **TOTALS** | **47** | **20** | **29** | **29** | **17** | **43** | **21** | **26** | **14** | **32** | **28** | **19** | **30** | **15** | **10** | **14** | **28** | **12** | **9** | **18** |

**References** (only those not listed in the main article)

Agyare, A., Murray, G., Dearden, P. & Rollins, R. (2015) Conservation in context: variability in desired and perceived outcomes of community based natural resources governance in Ghana. *Society and Natural Resources*, 28, 975–994.

Black, S.A. (2015) A clear purpose is the start point for conservation leadership. *Conservation Letters*, 8, 383–384.

Blickley, J.L., Deiner, K., Garbach, K., Lacher, I., Meek, M.H., Porensky, L.M. et al. (2013) Graduate student’s guide to necessary skills for nonacademic conservation careers. *Conservation Biology*, 27, 24–34.

Bodin, O. & Crona, B. (2008) Management of natural resources at the community level: exploring the role of social capital and leadership in a rural fishing community. *World Development*, 36, 2763–2779.

Butler, J.R.A., Young, J.C., McMyn, I.A.G., Leyshon, B., Graham, I.M., Walker, I. et al. (2015) Evaluating adaptive co-management as conservation conflict resolution: learning from seals and salmon. *Journal of Environmental Management*, 160, 212–225.

Christiansen, T. & Belton, L. (2017) Wyoming sage-grouse working groups: lessons learned. *Human–Wildlife Interactions*, 11, 274–286.

Clark, A., Thompson, T., Vernon, J., Whittakker, A. (2017) Utah’s watershed restoration initiative: restoring watersheds at a landscape scale. *Human–Wildlife Interactions*, 1, 302–310.

Crona, B., Gelcich, S. & Bodin, O. (2017) The importance of interplay between leadership and social capital in shaping outcomes of rights-based fisheries governance. *World Development*, 91, 70–83.

Diedrich, A., Stoeckl, N., Gurney, G.G., Esparon, M. & Pollnac, R. (2017) Social capital as a key determinant of perceived benefits of community-based marine protected areas. *Conservation Biology*, 31, 311–321.

Foster, M.J., Bennett, C., Sterling, E.J. & Bynum, N. (2011) Fostering the development of conservation leadership at minority-serving institutions. *Fisheries*, 36, 461–463.

Game, E.T., Meijaard, E., Sheil, D. & McDonald-Madden, E. (2014) Conservation in a wicked complex world: challenges and solutions. *Conservation Letters*, 7, 271–277.

Giakoumi, S., McGowan, J., Mills, M., Beger, M., Bustamante, R.H., Charles, A. et al. (2018) Revisiting “success” and “failure” marine protected areas: a conservation scientist perspective. *Frontiers in Marine Science*, 5, 1–5.

Gruber, J.S. (2010) Key principles of community-based natural resource management: a synthesis and interpretation of identified effective approaches for managing the commons. *Environmental Management*, 45, 52–66.

Head, B.W., Ross, H. & Bellamy, J. (2016) Managing wicked natural resource problems: the collaborative challenge at regional scales in Australia. *Landscape and Urban Planning*, 154, 81–92.

Kenward, R.E., Whittingham, M.J., Arampatzis, S., Manos, B.D., Hahn, T., Terry, A. et al. (2011) Identifying governance strategies that effectively support ecosystem services, resource sustainability, and biodiversity. *Proceedings of the National Academy of Science of the United States of America*, 108, 5308–5312.

Langholz, J.A. & Abeles, A. (2014) Rethinking postgraduate education for marine conservation. *Marine Policy*, 43, 372–375.

Leahy, J.E. & Anderson, D.H. (2008) Trust factors in community-water resource management agency relationships. *Landscape and Urban Planning*, 87, 100–107.

Leisher, C., Brouwer, R., Boucher, T.M., Vogelij, R., Bainbridge, W.R. & Sanjayan, M. (2011) Striking a balance: socioeconomic development and conservation in grassland through community-based zoning. *PLOS ONE*, 6, e28807.

Liu, B.M., Abebe, Y., McHugh, O.V., Collick, A.S., Gebrekidan, B. & Steenhuis, T.S. (2008) Overcoming limited information through participatory watershed management: case study in Amhara, Ethiopia. *Physics and Chemistry of the Earth*, 33, 13–21.

Lockwood, M., Davidson, J., Hockings, M., Haward, M. & Kriwoken, L. (2012) Marine biodiversity conservation governance and management: regime requirements for global change. *Ocean and Coastal Management*, 69, 160–172.

Mannetti, L.M., Esler, K.J., Knight, A.T. & Vance-Borland, K. (2015) Understanding social networks to improve adaptive co-governance with the Khomani Bushmen of the Kalahari, South Africa. *Human Ecology*, 43, 481–492.

Mattson, D.J., Clark, S.G., Byrd, K.L., Brown, S.R. & Robinson, B. (2011) Leaders’ perspectives in the Yellowstone to Yukon conservation initiative. *Policy Sciences*, 44, 103–133.

McKiernan, S. (2018) Managing invasive plants in a rural-amenity landscape: the role of social capital and landcare. *Journal of Environmental Planning and Management*, 61, 1419–1437.

Micheli, F. & Niccolini, F. (2013) Achieving success under pressure in the conservation of intensely used coastal areas. *Ecology and Society*, 18, 19.

Mountjoy, N.J., Seekamp, E., Davenport, M.A. & Whiles, M.R. (2014) Identifying capacity indicators for community-based natural resource management initiatives: focus group results from conservation practitioners across Illinois. *Journal of Environmental Planning and Management*, 57, 329–348.

Pero, L.V. & Smith, T.F. (2008) Institutional credibility and leadership: critical challenges for community-based natural resource governance in rural and remote Australia. *Regional Environmental Change*, 8, 15–29.

Scheele, B.C., Legge, S., Armstrong, D.P., Copley, P., Robinson, N, Southwell, D. et al. (2018) How to improve threatened species management: An Australian perspective. *Journal of Environmental Management*, 223, 668–675.

Smith, K.N., Shaw, J.H., Bettinger, T., Caniglia, B. & Carter, T. (2007) Conservation partnerships between zoos and aquariums, federal and state agencies, and nongovernmental organizations. *Zoo Biology*, 26, 471–486.

Stern, M.J. & Predmore, S.A. (2012) The importance of team functioning to natural resource planning outcomes. *Journal of Environmental Management*, 106, 30–39.

Stöhr, C., Lundholm, C., Crona, B. & Chabay, I. (2014) Stakeholder participation and sustainable fisheries: an integrative framework for assessing adaptive comanagement processes. *Ecology and Society*, 19, 14.

Sudtongkong, C. & Webb, E.L. (2008) Outcomes of state- vs. community-based mangrove management in southern Thailand. *Ecology and Society*, 13, 27.

Sullivan, T.K. & Syvertsen, A.K. (2019) Conservation leadership: a development model. *Journal of Adolescent Research*, 34, 140–166.

*Journal of Adolescent Research*, 34, 140–166.

Sutton, A.E. (2015) Leadership and management influences the outcome of wildlife reintroduction programmes: findings from the sea eagle recovery project. *PeerJ*, 3, 1–22.

Sutton, A.M. & Rudd, M.A. (2015) The effect of leadership and other contextual conditions on the ecological and socio-economic success of small-scale fisheries in Southeast Asia. *Ocean and Coastal Management*, 114, 102–115.

Wallace, R.L. (2003) Social influences on conservation: lessons from US recovery programmes for marine mammals. *Conservation Biology*, 17, 104–115.

Walters, C.J. (2007) Is adaptive management helping to solve fisheries problems? *Ambio*, 36, 304–307.

Zulu, L.C. (2008) Community forest management in southern Malawi: solution or part of the problem? *Society and Natural Resources*, 21, 687–703.