Commission du Patrimoine Géomorphologique
Comité National Français de Géographie

Lettre d'information n°22
Octobre 2020

Sommaire

SÉANCE THÉMATIQUE DU 12 DECEMBRE 2020 2
Déroulement de la réunion et informations pratiques 2
Présentation de la séance thématique : Les temps du géopatrimoine : appel à contribution.....3

HOMMAGES A J.-J. DUFAURE ET H. ROUGIER 4
Texte d'hommage à Jean-Jacques Dufaure 4
Texte d'hommage à Henri Rougier 5

ACTUALITÉS ET INFORMATIONS DIVERSES
Avis de publications et recensions d'ouvrages 6
Colloques et congrès internationaux 9
Revues internationales sur les géopatrimoines 11
Actualités du CNFG 13

ANNEXES
Souscription à l'ouvrage « centenaire du CNFG »
Sommaire de l'ouvrage T*he Geotourism industry in the 21st century*

Edito

Cher.e.s membres de la Commission du Patrimoine Géomorphologique,

L'année 2020 marque la dixième année d'existence de notre Commission. Cette année est particulière à bien d'autres égards, tant la pandémie de la Covid-19 a bouleversé notre quotidien et nos activités. Pour notre Commission, la crise sanitaire, alors au plus fort de son intensité au printemps dernier, nous avait conduit à annuler l'excursion de terrain dans le PNR Normandie-Maine. Nous souhaitons la reprogrammer à l'identique au printemps prochain (les dates restent encore à définir), si la situation le permet (soyons optimistes !). À plus court terme, nous espérons aussi que l'évolution de la situation sanitaire nous permettra de nous retrouver bientôt, comme à chaque fin d'année à Paris, lors du deuxième samedi de décembre. La séance thématique du 12 décembre prochain portera sur « les temps du géopatrimoine ». L'appel à contributions, les modalités d'organisation et le déroulement de la journée sont indiqués en première partie de la lettre. Notez que notre réunion aura lieu parallèlement aux célébrations du Centenaire du CNFG, qui se tiendront aussi dans les locaux de l'Institut de Géographie ce même samedi, et auxquelles nous vous invitons à participer après l'Assemblée Générale de notre Commission (à partir de 15h30).

L'année 2020 est aussi une triste année pour notre Commission, puisque nous avons eu la douleur d'apprendre la disparition de deux de ses membres, Jean-Jacques Dufaure et Henri Rougier. Deux textes d'hommage sont publiés dans la deuxième partie de cette lettre : nous remercions Bruno Comentale et Robert Moutard pour leurs très beaux textes retraçant le parcours de ces deux géomorphologues, qui ont participé activement aux journées d'études et aux excursions de notre Commission depuis son origine.

Finissons cet éditorial par une grande satisfaction : l'année 2020 est aussi celle qui a vu la parution tant attendue du *Guide pratique de valorisation des géomorphosites* aux Presses Universitaires de Savoie ! Nous remercions une nouvelle fois Martine Ambert et Nathalie Cayla pour la coordination de ce bel ouvrage, qui récompense un travail collectif de plusieurs années. Nul doute qu'il sera un succès auprès des universitaires, des étudiants, des gestionnaires et des professionnels impliqués dans la reconnaissance, la protection et la valorisation des patrimoines géomorphologiques ! Dans le domaine du géopatrimoine, d'autres ouvrages ont été édités cette année : toutes les actualités et les événements géopatrimoniaux – passés et à venir – alimentent finalement la troisième et dernière partie de la lettre.

Nous vous souhaitons une très bonne lecture de cette Lettre n°22 et espérons vous retrouver nombreux.ses le 12 décembre prochain à Paris !

Le Président : François Bétard
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la Secrétaire : Isabelle Aubron
isabelle.aubron@parc-normandie-maine.fr

Séance thématique du 12 décembre 2020

La prochaine réunion de la CPG se déroulera le samedi 12 décembre 2020 à l'Institut de Géographie à Paris (191 rue Saint-Jacques) en salle 316, de 10h à 15h30. Nous remercions Lydie Goeldner-Gianella, directrice de l'Institut de Géographie, et Marine Leopoldie (gestionnaire des salles de l'UFR de géographie de Paris 1) pour la mise à disposition et la réservation de la salle.

Déroulement de la réunion du 12 décembre 2020 et informations pratiques

La journée commencera à 10h00 (accueil dès 9h30) en salle 316 (3e étage de l'Institut). Nous déjeunerons de 12h30 à 14h00 dans un restaurant-pizzeria de la rue Saint-Jacques. La journée se terminera aux alentours de 15h30, afin de permettre aux participants d'assister ensuite aux célébrations du centenaire du CNFG qui auront lieu le même jour à l'Institut de Géographie. Merci de nous confirmer dès que possible votre présence à la réunion et à la pause-déjeuner, et dans tous les cas avant le 1er décembre prochain, afin que nous réservions le restaurant du midi, en répondant à :

francois.betard@u-paris.fr et
isabelle.aubron@parc-normandie-maine.fr

La réunion du 12 décembre 2020 se déroulera en deux temps. La matinée (10h-12h30) sera consacrée à la présentation des communications orales en lien avec le thème de la séance que nous avons retenu pour cette année, autour des « temps du géopatrimoine ». Après la pause-déjeuner, l'après-midi (14h-15h30) sera consacrée à l'Assemblée Générale de notre Commission. Nous dresserons alors le bilan d'activités de l'année écoulée et évoquerons les éléments de prospective pour 2021. Ce sera notamment l'occasion de faire le point sur les actualités géopatrimoniales récentes ou à venir (parution d'ouvrages, publications des membres de la Commission, annonces de colloques et workshops, etc.) et de vous représenter brièvement le projet d'excursion du printemps 2021 dans le PNR Normandie-Maine (proposition d'Isabelle Aubron), avec sondage pour le choix des dates. Nous discuterons également des actualités du CNFG et de leurs implications pour notre Commission, notamment dans la perspective de l'organisation du Congrès UGI Paris 2022.

La Chapada do Araripe, Géoparc mondial UNESCO (Ceara, NE Brésil). Photo : F. Bétard.

Présentation de la séance thématique « Les temps du géopatrimoine » : appel à contributions

La réunion du 12 décembre aura pour thématique « *Les temps du géopatrimoine* ». Le choix de ce thème, validé lors de notre dernière assemblée générale, a été guidé par la préparation du Congrès UGI Paris 2022, dont le thème général sera sur « *Le temps des géographes* ». Il s'agit donc d'engager la réflexion en vue de proposer, conjointement avec la Commission *Geoheritage* de l'UGI, une session scientifique sur ce thème lors de ce congrès exceptionnel, mais aussi d'engager la réflexion pour notre propre Commission, car la dimension temporelle des géopatrimoines a été peu abordée jusqu'à présent lors de nos différentes journées d'étude. Sans prétendre ici à l'exhaustivité, plusieurs axes de réflexion peuvent être dégagés :

(i) Âges et échelles temporelles des sites et objets géopatrimoniaux (*e.g.* géosites actifs *vs.* géosites hérités) ;

(ii) Trajectoires patrimoniales et processus de géopatrimonialisation ;

(iii) Évolution des sites et objets géopatrimoniaux dans un contexte de Changement Global, incluant les stratégies de conservation et d'adaptation face à ces changements et aux menaces qui en résultent ;

(iv) Mesures, suivis et évaluations multi-temporelles des sites et objets géopatrimoniaux par des systèmes de *monitoring* environnemental ;

(v) Promotion et valorisation du géopatrimoine dans les parcs naturels et les géoparcs par l'usage de médias axés sur le temps (*e.g.*, concept PPF) ;

(vi) Temps de la gestion et de la valorisation vs. temps de la recherche (synchronicité ? déconnexion ?).

Nous avons déjà reçu deux propositions de communications depuis notre premier appel lancé en mars dernier dans la Lettre n°21 :

- Fabien Hobléa : « La profondeur temporelle des géomorphosites et ses applications » ;
- Pierre Guérémy : « Réflexions au sujet de la mise en évidence possible des variations du niveau des mers, par une analyse de tout un patrimoine d'anciennes formes de terrain fossiles, en Calabre, dans un domaine soulevé, au cours du dernier interglaciaire ».

Nous avons encore de la place pour deux autres communications sur ce thème. Les propositions de communications orales sont à envoyer à François Bétard (francois.betard@u-paris.fr) et Isabelle Aubron (isabelle.aubron@parc-normandie-maine.fr) avant le 1er décembre prochain. Toutes les communications orales auront lieu dans la matinée du 12 décembre, afin de laisser place à l'Assemblée Générale de la Commission dans l'après-midi.

Hommages à J.-J. Dufaure et H. Rougier

Texte d'hommage à Jean-Jacques Dufaure

Le Professeur Jean-Jacques Dufaure vient de décéder dans sa quatre-vingt-huitième année. Membre de la Commission du Patrimoine Géomorphologique du Comité National Français de Géographie, il en suivait les travaux depuis sa création. Il avait en effet participé à la réunion fondatrice tenue à l'initiative de D. Sellier en 2008 à l'université de Nantes – de même que ses collègues géomorphologues hellénistes, B. Bousquet et P.-Y. Péchoux, en compagnie desquels il publia à plusieurs reprises –, et assistait régulièrement aux réunions de décembre, à l'Institut de Géographie du 191, rue Saint-Jacques à Paris – où il avait été professeur jusqu'au début des années 1990. Il fut également Directeur-Adjoint du Laboratoire de Géomorphologie de Meudon-Bellevue, qui porta longtemps le nom de Pierre Birot.

La carrière de J.-J. Dufaure, normalien (rue d'Ulm) et agrégé de Géographie, est avant tout associée à la géomorphologie des espaces méditerranéens, particulièrement de la Grèce et notamment du Péloponnèse, sujet de sa thèse d'Etat dirigée par le Professeur Pierre Birot (1975). Cette dernière signe une double orientation, vers la morphotectonique en domaine de forte mobilité, et vers la géoarchéologie, prolongement de ses travaux sur l'alluvionnement récent au pourtour de la Méditerranée, qu'il inaugure par son étude de la terrasse holocène d'Olympie (1976). Il publie ainsi de nombreux articles, dont plusieurs en collaboration, en particulier avec B. Bousquet et P.-Y. Péchoux (géomorphologie hellénique, sismicité historique), ou avec R. Neboit (érosion en roche meuble et réseau hydrographique en Lucanie). Le volume d'hommage à P. Birot, *La mobilité des paysages méditerranéens* (1984), ouvrage novateur construit autour des grandes thématiques régionales, que coordonne J.-J. Dufaure et qui regroupe les géomorphologues méditerranéistes disciples de P. Birot – parmi lesquels P. Guérémy, également membre de la Commission –, témoigne de ces collaborations fécondes.

Esprit brillant et de grande culture, J.-J. Dufaure fascinait ses étudiants par la rigueur de ses analyses et les vastes fresques qu'il savait brosser avec enthousiasme, dépassant le cadre de la discipline, et élargissant l'espace géographique de son enseignement, en grand pédagogue. À l'université de Rouen, puis à l'université Paris IV où il enseigna à partir des années 1980, il communiqua cette énergie à plusieurs étudiants qui furent ensuite ses élèves, J. Rodet (le karst de la craie en Normandie), M. Rasse, D. Bossuyt, J. et R. Poudou (Apennins central et méridional), E. Fouache (géoarchéologie en Grèce et en Méditerranée orientale), ainsi que l'auteur de ces lignes. Visitant les terrains de thèse de ses élèves, il déployait la même pédagogie minutieuse, faisant preuve de cet esprit vulgarisateur qui anime par

Paysages gréseux du Parc national de Sete Cidades (Piaui, NE Brésil). Photo : F. Bétard.

ailleurs les travaux actuels de la Commission.
À son épouse, géographe, à leur fils Laurent, nous exprimons notre sympathie avec une profonde émotion.

Bruno Comentale, le 24 mars 2020

Texte d'hommage à Henri Rougier

« Cherchons comme cherchent ceux qui doivent trouver, et trouvons comme trouvent ceux qui doivent chercher encore… ». Henri Rougier, agrégé et Docteur d'État en géographie, Professeur émérite des Universités, qui nous a quittés le 14 septembre, dans sa soixante-quinzième année, se référait volontiers à cette maxime de Saint Augustin d'Hippone. Ainsi justifiait-il son inlassable quête documentaire, nécessaire à l'écriture de la trentaine d'ouvrages et de plusieurs dizaines d'articles qu'il nous a laissés. Il a vécu ses derniers jours à Voiron, petite ville de l'Isère, où il avait élu domicile, non loin de Grenoble et de son Institut de Géographie alpine où il enseigna en tant que Maître de conférences. C'est là qu'il avait au préalable élaboré, sous la férule du Doyen Paul Veyret, la thèse d'État qu'il a soutenue en 1979, sur les hautes vallées du Rhin. Il a poursuivi sa carrière en tant que Professeur des Universités à Lyon III, où il a fondé en 1995 le Centre d'Études alpines, dans la logique de sa prédilection pour le monde montagnard.

Il résidait souvent à Chamonix, à deux pas de sa seconde patrie : la Suisse. C'est dans le Valais, à Chamoson, qu'il a établi le siège de la société *Géoterrain*, dont il était le président et fondateur. Cette localité, dominée par le rebord méridional des Alpes Bernoises, lui a décerné la dignité de Bourgeois d'Honneur, en reconnaissance du parcours de découverte de géomorphosites exceptionnel par ses dimensions, qu'il y a conçu et réalisé. Ainsi a-t-il concrétisé sa passion pour la géomorphologie. Loin de s'enfermer dans cette spécialité, il a travaillé jusqu'à son dernier souffle à un ouvrage sur la civilisation des Walser, qui a laissé des empreintes paysagères emblématiques en divers cantons de la Confédération helvétique. Son parfait bilinguisme franco-germanique issu de l'obtention d'une licence d'Allemand en même temps que celle de géographie, a facilité ses investigations dans l'arc alpin tout entier. Il lui a permis aussi de donner des cours et des conférences en cette langue pendant près d'un quart de siècle, principalement à l'Université Humboldt et à l'Université Libre à Berlin, ainsi qu'à celle de Halle, dans le cadre d'échanges Erasmus. Il aimait accueillir des doctorants allemands dans le Valais ou dans la vallée de Chamonix, ainsi que des étudiants français dans la Réserve naturelle des Aiguilles Rouges dont il présida le Conseil scientifique jusqu'en 2017, au terme d'une collaboration d'une vingtaine d'années avec cet organisme. Sur le terrain de cet espace protégé, il encadra des dizaines de mémoires de Maîtrise, puis de Master. Le terrain : un terme auquel il n'a cessé de se référer, comme son modèle Raoul Blanchard, à qui il vouait une admiration indéfectible.

Membre de la Commission du Patrimoine

Géomorphologique du Comité National Français de Géographie, des sociétés de Géographie de Paris et de Genève et d'associations scientifiques allemandes, Henri Rougier n'a pas limité à l'Europe ses investigations et ses voyages d'études. Il a publié en 1987 un ouvrage sur les *Espaces et régions du Canada*, puis, en 2001, avec ses collègues G. Wackermann et G. Mottet, un tour d'horizon mondial sur la *Géographie des montagnes*.

Il excellait dans les analyses paysagères qui ont fait la substance de livres plus récents consacrés à la Suisse, notamment à la région de Zermatt et à son emblématique Cervin.

Après une existence bien remplie au cours de laquelle il ne se s'est guère accordé de répit, Henri Rougier est allé reposer en sa terre d'origine provençale, laissant un vide qui n'est pas près de se combler dans la mémoire de ceux qui ont travaillé à ses côtés.

À son épouse, nous adressons l'expression de notre profonde émotion et de toute notre sympathie.

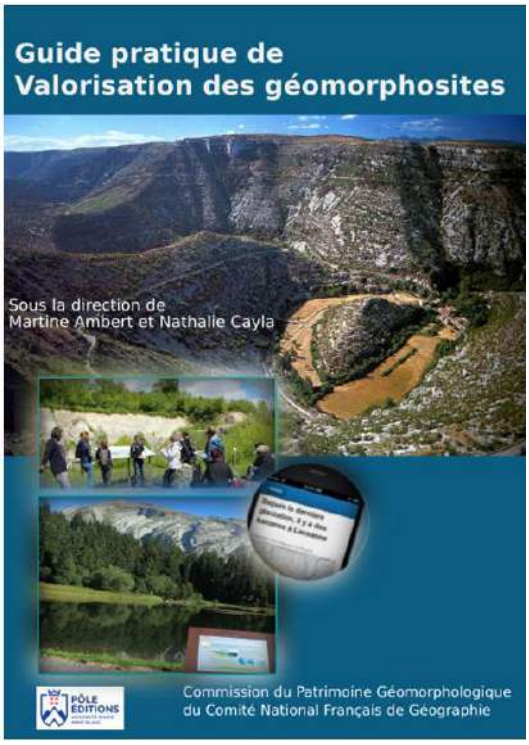
Robert Moutard, le 25 septembre 2020

Actualités et informations diverses

Avis de publications et recensions d'ouvrages

Guide pratique de valorisation des géomorphosites par Martine Ambert et Nathalie Cayla (Coord.), Presses Universitaires de Savoie, 2020

Coordonné par Martine Ambert et Nathalie Cayla, et désormais vitrine des travaux de notre Commission, le *guide pratique de valorisation des géomorphosites* vient d'être publié aux Presses Universitaires de Savoie. L'orientation du guide émane du double constat suivant : d'une part l'engouement des collectivités pour mettre en valeur, dans une



perspective touristique, les sites naturels paysagers de leur territoire, si nombreux et si divers en France et, d'autre part, le manque d'outils méthodologiques à disposition de ces collectivités.

Erosion du monzogranite de Kerlaouan (Finistère). Photo : I. Aubron.

L'approche géomorphologique, qui s'intéresse au relief, est un atout essentiel à la valorisation des géopatrimoines.

Ce guide propose une approche fondée sur des retours d'expériences pratiques conduites par les membres de la Commission du Patrimoine Géomorphologique du CNFG. Exemples français et étrangers permettent de se familiariser avec diverses approches de médiation. Deux publics principaux sont visés par ce guide : outre les décideurs et aménageurs œuvrant à la valorisation des sites naturels paysagers, les étudiants des filières professionnalisantes liées au patrimoine (connaissance, médiation, valorisation).

Quatre nouveaux guides des *Curiosités géologiques* publiés en 2020

Les ouvrages de la collection «Curiosités géologiques» présentent chacun une vingtaine de sites sélectionnés pour leur intérêt géologique ou géomorphologique. Les Éditions du BRGM viennent de publier quatre nouveaux titres en 2020 :

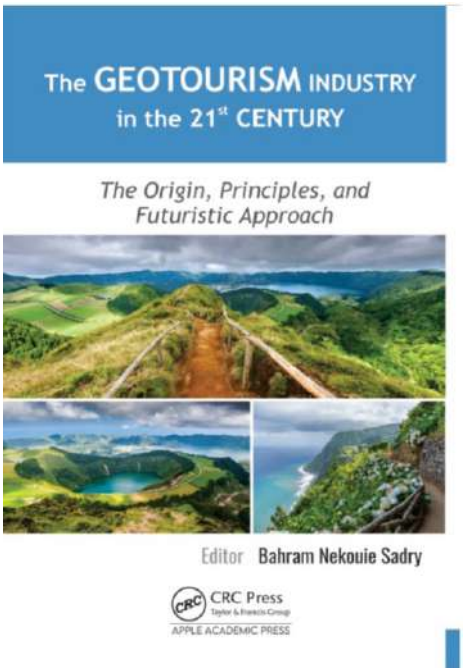
- *Curiosités géologiques du littoral vendéen* (2nde édition) par Pascal Bouton, Claude Roy, Jean-Marc Viaud et Gaston Godard
- *Curiosités géologiques des plaines et bocages de Vendée* par Pascal Bouton, Claude Roy et Jean-Marc Viaud
- *Curiosités géologiques du Morbihan* par Pierrick Graviou, Romain Augier et Elisabeth Le Goff
- *Curiosités géologiques des plages du Débarquement en Normandie* par Renaud Couëffé

Le Tour de France du littoral : regard d'un géologue par François Michel, Éditions du BRGM, 2020

Après le succès du T*our de France d'un géologue*, François Michel présente *Le Tour de France du littoral*. Une invitation à découvrir ou redécouvrir l'ensemble des rivages français avec ici le regard du géologue.

***The Geotourism industry in the 21st century. The origin, principles, and futuristic approach,* by Baharam N. Sadry (Ed.), CRC Press, 2020**

Cet ouvrage, entièrement en anglais, vient tout juste d'être publié aux CRC Press (Taylor & Francis Group). Il offre un vaste panorama et une diversité d'approches sur le géotourisme et les pratiques géotouristiques dans le monde (voir le sommaire détaillé de l'ouvrage en annexe de cette lettre). À noter que l'un des chapitres de l'ouvrage a été rédigé par Nathalie Cayla, membre de notre Commission. BRAVO à elle !



Les membres de la CPG publient ! Une sélection d'articles parus en 2020

Ancrenaz **A., Defive E., Poiraud A.** (2020). Fluctuations glaciaires au Pléistocène supérieur dans les Monts d'Aubrac (Massif central, France) : nouvelles données. *Géomorphologie : relief, processus, environnement,* 26(2), pp. 141-155

Aubron I. (2020). Les pierriers *in* Dossier « Relations biodiversité-géodiversité ». *Géochronique*, 155, pp. 58-63.

Bell R., **Fort M.**, Götz J., Bernsteiner H., Andermann C., Etzlstorfer J., Poscha E., Gurung N., Gurung S. (2020). Major geomorphic events and natural hazards during monsoonal precipitation 2018 in the Kali Gandaki Valley, Nepal Himalaya. *Geomorphology*, doi: 10.1016/j.geomorph.2020.107451

Bétard F. (2020). Insects as zoogeomorphic agents: An extended review. *Earth Surface Processes and Landforms*, doi:10.1002/esp.4944

Cayla N. (2020). Dinosaur Geotourism: A World-Wide Growing Tourism Niche. In Sadry B.N. (Ed.), *The Geotourism Industry in the 21st Century. The Origin, Principles, and Futuristic Approach*, CRC Press, pp. 449-472.

De Matos-Machado R., Toumazet J.-P., Jacquemot S. (2020). Cartographie semi-automatisée et classification des réseaux de tranchées et boyaux du champ de bataille de Verdun à partir du LiDAR aéroporté. *Archéologies numériques,* 4(1), doi:10.21494/ISTE.OP.2020.0525

Huguet F. (2020). Le Cervin, sommet mythique et géomorphosite emblématique des Alpes suisses. *Physio-Géo*, 15, pp. 29-40.

Sellier D. (2020). La représentation du relief de Pegwell Bay (Kent) par William DYCE : géomorphosite et peinture de paysage. *Physio-Géo*, 15, pp. 161-182.

Tourbière holocène fossile (Finistère). Photo : I. Aubron.

Colloques et congrès internationaux

... auxquels des membres de la CPG ont participé en 2020

Colloque international ***« De la réserve intégrale à la nature ordinaire : les figures changeantes de la protection de la nature (XIXe - XXIe siècle) », 29-30 septembre 2020,*** Archives Nationales de Paris, Pierrefitte-sur-Seine.

Après avoir été plusieurs fois reporté, ce colloque organisé par l'AHPNE (Association pour l'histoire de la protection de la nature et de l'environnement) a finalement eu lieu les 29 et 30 septembre 2020 aux Archives Nationales de Paris, en format hybride « présentiel/distanciel ». Ce format a permis de capter l'attention de 271 visiteurs en ligne le premier jour et 178 le second, avec respectivement des moyennes de 70 et 60 visiteurs connectés simultanément, en plus de la quarantaine de participants physiquement présents dans l'auditorium.

Deux communications orales par des membres de la Commission ont été présentées lors de ce colloque :

- *« Protection de la nature abiotique et géoconservation en France : évolutions de la législation et des pratiques du XIXe s. à nos jours »* (par François Bétard, Isabelle Aubron, Fabien Hobléa, Claire Portal, Nathalie Cayla, Christian Giusti et Alexandre Poiraud) ;
- *« Aménager les territoires et protéger les espaces naturels : une compatibilité introuvable ? Le cas des Bornes Aravis en Haute-Savoie »* (par Robert Moutard).

Les diaporamas et les vidéos des communications seront bientôt disponibles sur le site de l'AHPNE (https://ahpne.fr/). Par ailleurs, les textes de ces communications seront publiés sous forme d'actes à paraître en 2021 au Presses Universitaires de Rennes.

... à venir en 2021

***EGU General Assembly,* 25-30 avril 2021**, Vienne (Autriche).

Comme beaucoup de colloques et manifestations scientifiques depuis la crise sanitaire liée à la Covid-19, le prochain congrès de l'EGU se fera en format hybride « présentiel/distanciel ». En 2021, deux sessions virtuelles avec présentations courtes (Virtual PICO) concerneront le champ de la géodiversité et des géopatrimoines :

- *Visages of geodiversity: time-spatial scales, uncertainty of assessments, promotional activities* (Convener : Zbigniew Zwoliński | Co-conveners : Irene Bollati, Marco Giardino, Alicja Najwer, Franziska Schrodt) : https://meetingorganizer.copernicus.org/EGU2021/session/40267
- *Visages of Geoheritage* (Convener : Paola Coratza | Co-conveners : Paula Naomi IraptaECS, Lucie Kubalikova, Márton PálECS, Benjamin van Wyk de Vries) : https://meetingorganizer.copernicus.org/EGU2021/session/40291

L'appel à communications est déjà lancé (date-limite de soumission des résumés fixée au 13 janvier 2021). Rendez-vous sur https://egu2021.eu/ pour tous les détails et informations pratiques.

***10th International Conference on Geomorphology,* 6-10 septembre 2021**, Coimbra (Portugal).

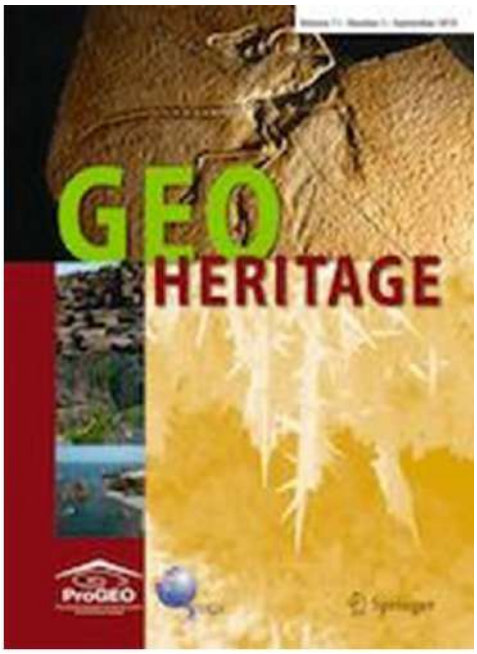
La prochaine conférence internationale de géomorphologie de l'IAG (*International Association of Geomorphologists*) aura lieu du 6 au 10 septembre 2021 à Coimbra (Portugal), avec comme thème central « *Geomorphology and Global Change* ». Une session thématique sera consacrée au géopatrimoine et au géotourisme (session 21 : « *Geoheritage, Cultural Geomorphology and Geotourism* »). Plusieurs excursions de terrain (pré-, inter- et post-conférence) seront organisées sur des espaces géopatrimoniaux (Serra da Estrela, Arouca Geopark, Madère, Les Açores…). Les soumissions de résumés pourront se faire entre le 15 janvier et le 15 mars 2021. Toutes les informations sont ici : https://www.icg2021.eu/

Grès et poudingues ordoviciens d'Erquy (Cote d'Armor). Photo : I. Aubron.

Revues internationales sur les géopatrimoines

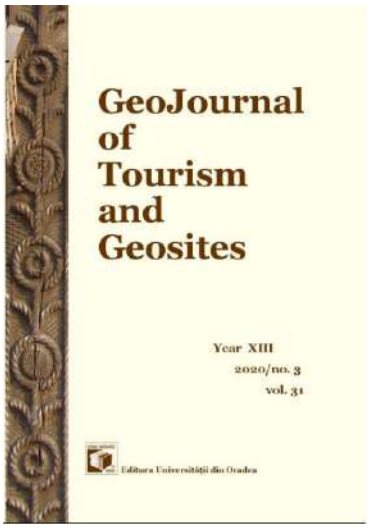
Ci-dessous sont référencées les principales revues internationales spécialisées sur les géopatrimoines, dans lesquelles les membres de la CPG sont invités à publier pour une diffusion internationale de leurs travaux :

Geoheritage (https://www.springer.com/journal/12371) : elle est la plus connue de toutes, et certainement celle dans laquelle les membres de la CPG ont le plus publié depuis sa création en 2009. Soutenue par l'association européenne ProGEO et éditée chez Springer, elle couvre tous les aspects du géopatrimoine, de l'inventaire à la protection et à la valorisation, qu'il s'agisse du géopatrimoine *in situ* ou *ex situ*. Le champ de la géodiversité et ses liens avec la biodiversité sont aussi couverts. Elle possède un facteur d'impact en constante augmentation année après année (IF 2019 : 3.062), témoignant ainsi de son influence de plus en plus grande et de son rayonnement international.



International Journal of Geoheritage and Parks (https://www.sciencedirect.com/journal/international-journal-of-geoheritage-and-parks) : comme la précédente, c'est une revue de création récente, puisqu'elle a été fondée en 2013 à l'initiative de la faculté de géographie de l'Université Normale de Pékin. Soutenue par la Commission *Geoheritage* de l'UGI (Union Géographique Internationale), son orientation est moins géoscientifique et beaucoup plus ancrée dans le champ de la géographie territoriale et des espaces protégés (géoparcs, parcs nationaux, sites du Patrimoine Mondial de l'UNESCO…), avec un regard de sciences sociales sur les orientations et pratiques de gestion. La revue est aujourd'hui hébergée par Elsevier (ScienceDirect).

GeoJournal of Tourism and Geosites (http://gtg.webhost.uoradea.ro/) : née sous l'impulsion d'un groupe de chercheurs du département de géographie de l'Université d'Oradea (Roumanie) et de la faculté du tourisme de Gdańsk (Pologne), cette revue internationale est publiée entièrement en anglais depuis 2008. Elle accueille des contributions variées dans le domaine du tourisme au sens large, et du géotourisme en particulier (promotion des géosites). Bien qu'elle ne possède pas le rayonnement et la même lisibilité que les deux revues précédentes, elle répond aux standards internationaux de publication en matière de normes éditoriales et d'éthique, et l'avantage d'être entièrement en *open access*



Geoconservation Research (http://gcr.khuisf.ac.ir/) : créée en 2018 par l'université islamique Azad de Téhéran (Iran), elle est la dernière-née des revues consacrées au géopatrimoine. Comme la précédente, la revue est entièrement publiée en anglais en version *open access* et possède un comité de lecture international. Thématiquement, elle est plus spécialement centrée sur les problématiques de géoconservation, qui peuvent être abordées aussi bien d'un point de vue théorique que pratique, y compris dans leurs relations avec les aspects éducatifs ou géotouristiques. Mais tous les aspects du géopatrimoine et de la géodiversité sont potentiellement couverts.

À côté de ces revues spécialisées sur les géopatrimoines, de nombreuses autres revues « généralistes » à audience internationale, de géologie ou de géographie, sont susceptibles d'accueillir des articles sur la thématique géopatrimoniale. Parmi elles, la revue du Groupe Français de Géomorphologie – *Géomorphologie : relief, processus, environnement* – est une cible potentielle ayant déjà accueilli de nombreux articles sur le patrimoine géomorphologique et les géomorphosites. Elle présente l'avantage de publier en français comme en anglais, est dotée d'un facteur d'impact (IF 2019 : 0.775) et bénéficie depuis quelques années d'une version intégralement en ligne. La revue GRPE étant actuellement en recherche de nouveaux articles, nous encourageons tout particulièrement les membres de la CPG à soumettre leurs textes dans la revue du GFG qui est une association « partenaire ».

Ilôt saint -Michel et cordon de galet (Cote d'Armor). Photo : I. Aubron.

Actualités du CNFG

Bilan des Journées des Commissions du CNFG, 12-13 mars 2020

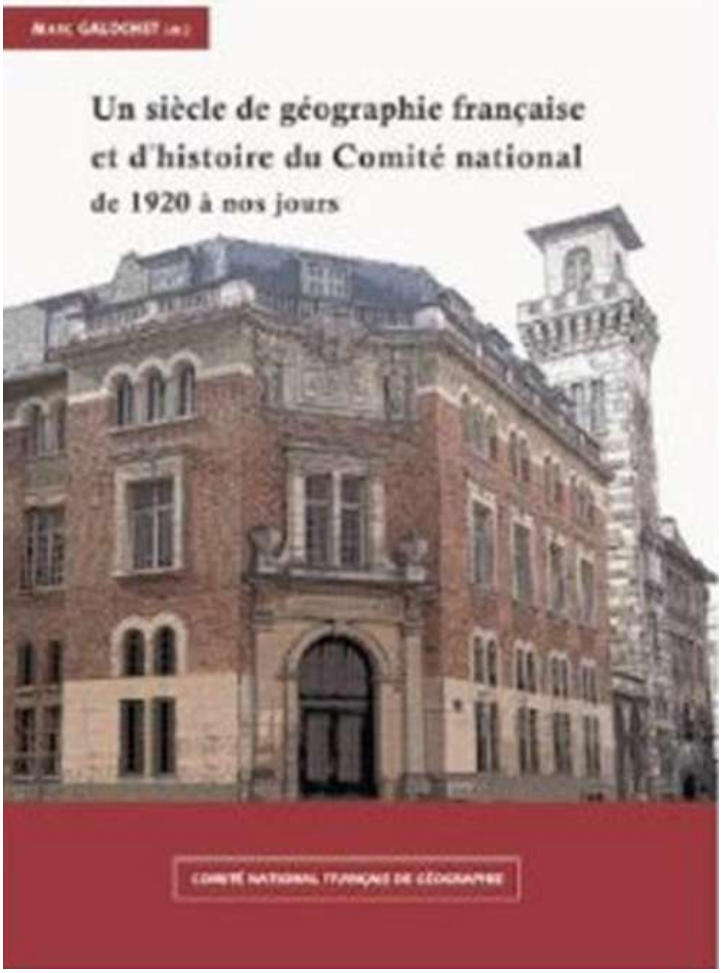
Cette journée et demi d'échanges, organisée par le CNFG les 12 et 13 mars 2020, avait pour objectif de mieux connaître les orientations des commissions, d'affiner leurs propositions pour le congrès de l'UGI de Paris 2022 et d'identifier les besoins de communication de chacun. 17 commissions étaient représentées. François Bétard y représentait la Commission du Patrimoine Géomorphologique. Les objectifs de la CPG, les tendances émergentes et les principaux enjeux scientifiques en vue du Congrès UGI Paris 2022 ont été présentés devant l'assemblée (*voir infra*).

Le bureau du CNFG a également insisté sur l'intérêt de rapprochements inter-commissions, pour le Congrès lui-même ou en dehors. Sur les questions de patrimonialisation de la nature, il est apparu que des liens pourraient être à construire avec plusieurs autres commissions du CNFG, comme celles de biogéographie, du tourisme et des loisirs, de géohistoire voire de géopolitique.

Célébrations du Centenaire du CNFG, 12 décembre 2020

Le Comité National Français de Géographie fête cette année son centenaire (1920-2020). Une journée de commémorations est programmée le 12 décembre 2020, à l'Institut de Géographie, parallèlement à notre réunion annuelle de la CPG. Lors de cette journée de célébration du centenaire, une session de communications sera consacrée aux terrains de la Géographie (journée d'études AGF-CNFG). Elle sera normalement suivie, l'après-midi, par une cérémonie de commémorations (sous réserve que la situation sanitaire le permette).

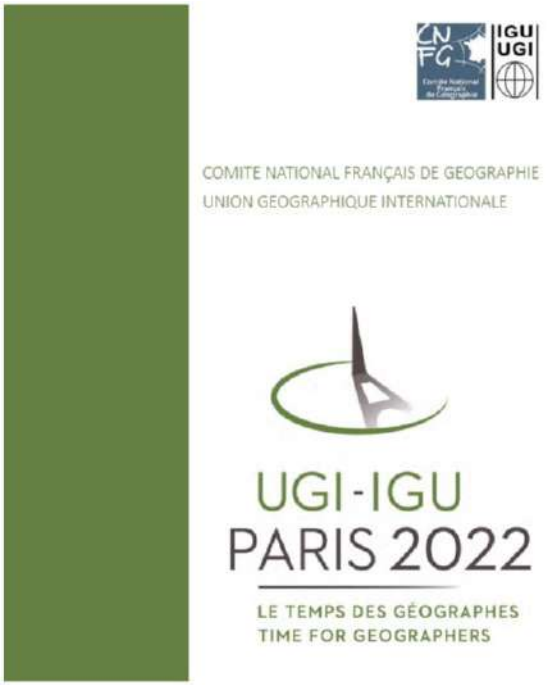
Par ailleurs, et toujours à l'occasion de ce centenaire, le CNFG publie un ouvrage retraçant u*n siècle de géographie française et d'histoire du Comité national de 1920 à nos jours* (coordination : Marc Galochet). Le bulletin de souscription à cet ouvrage (prix de vente à la souscription : 25 € - valable jusqu'au 10 novembre 2020) figure en annexe de cette lettre.

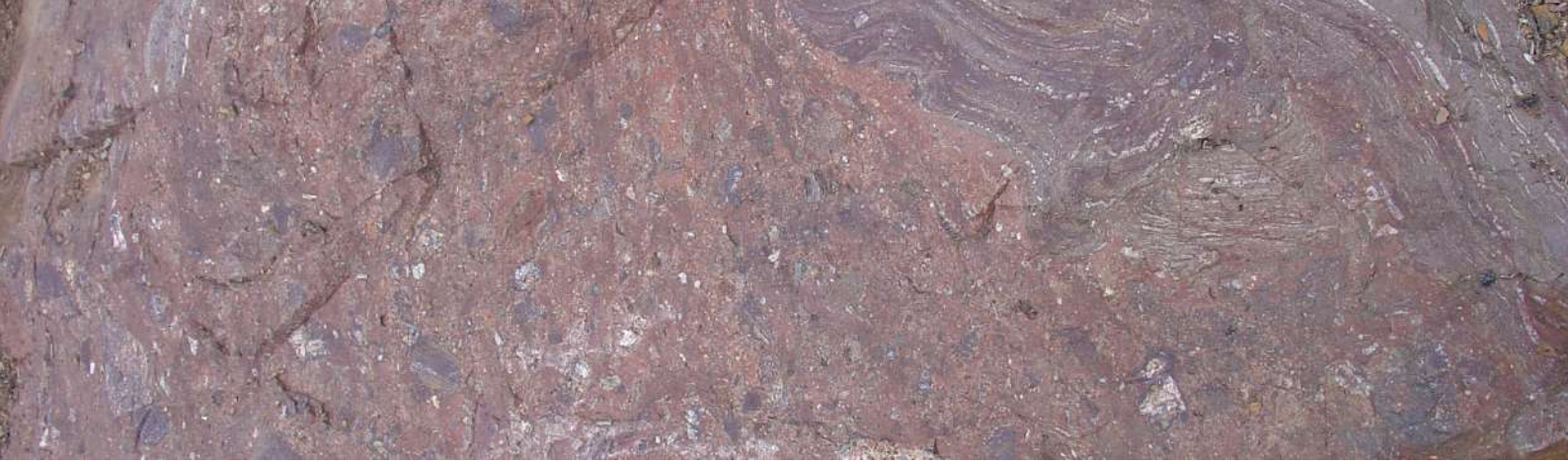


Congrès centenaire de l'UGI Paris 2022 – session « *Geoheritage* »

L'organisation par le CNFG de ce congrès exceptionnel, qui aura lieu du 18 au 22 juillet 2022 à Paris, sera l'occasion de célébrer le Centenaire de l'Union Géographique Internationale (UGI) dont le premier congrès s'est tenu à Paris en 1922. Le thème retenu pour ce congrès est « Le temps des géographes » (« *Time for Geographers* »). Les langues officielles seront l'anglais et le français. Le congrès aura lieu en plein cœur du quartier latin, avec des sessions et réunions scientifiques réparties sur plusieurs sites dont les bâtiments de Panthéon-Sorbonne, de l'Institut de Géographie et de la Société de Géographie.

Dans le cadre de l'appel à sessions thématiques, les commissions du CNFG étaient encouragées à se rapprocher des Commissions de l'UGI pour proposer des sessions scientifiques communes, coordonnées par les présidents des commissions CNFG et UGI. Il y a quelques mois, la Commission du Patrimoine Géomorphologique s'est ainsi rapprochée de la Commission *Geoheritage* de l'UGI, présidée par Wei Dongjing, pour proposer une session conjointe sur le thème suivant : *Time scaling issues in geoheritage studies*. Cette proposition a reçu un avis favorable, et il a été acté de publier les actes de la session dans la revue *International Journal of Geoheritage and Parks*, qui est la revue de la commission *Geoheritage* de l'UGI (hébergée par Elsevier : https://www.sciencedirect.com/journal/international-journal-of-geoheritage-and-parks). Les membres de la CPG seront tout particulièrement invités à participer à cette session, avec possibilité de soumettre ensuite leurs textes pour publication dans cette revue.





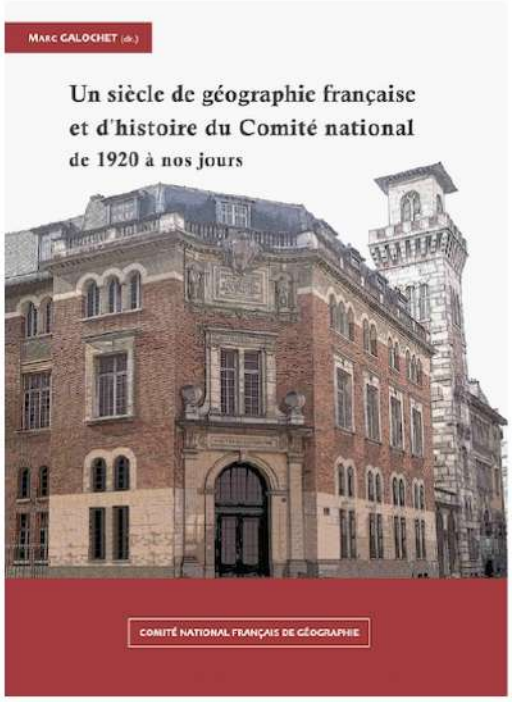
Impactites de Rochechouard (HauteVienne). Photo : I. Aubron.

ANNEXES

Annexe 1 : Souscription à l'ouvrage « centenaire du CNFG »

Annexe 2 : Sommaire de l'ouvrage The Geotourism industry in the 21st century

Annexe 1 : Souscription à l'ouvrage « centenaire du CNFG »



SOUSCRIPTION

Ouvrage publié à l'occasion du centenaire du Comité National Français de Géographie (CNFG)

Valable jusqu'au 10 novembre 2020

Si l'École française de géographie s'est développée à la fin du XIXe siècle sous l'impulsion de Paul Vidal de La Blache (1845-1918), elle s'est surtout structurée par les efforts d'Emmanuel de Martonne (1873-1955) qui a animé et administré le ***Comité National Français de Géographie (CNFG)*** pendant plus de trente ans (1920-1952). Créé au lendemain de la Première Guerre mondiale à l'initiative de l'Académie des Sciences le 7 juillet 1920, le Comité National Français de Géographie est l'institution politique officielle donnant une visibilité nationale et internationale à la discipline qui représente la communauté des géographes français auprès de l'Union Géographique Internationale (UGI), du Comité Français des Unions scientifiques internationales (COFUSI), et du Conseil international de la Science (ISC). Depuis un siècle, la géographie française n'a cessé de se développer, de se renouveler mais aussi de rayonner à travers le monde en montrant sa capacité à analyser et à comprendre les sociétés ainsi que les grands enjeux territoriaux actuels.

En retraçant un siècle d'histoire du Comité National Français de Géographie à l'occasion de son centenaire en 2020, cet ouvrage revient sur les héritages, les fondements, les évolutions et les acteurs majeurs qui ont participé à l'odyssée de cette institution fédératrice mais évoque également les perspectives et les objectifs poursuivis en ce début du XXIe siècle pour mieux comprendre le monde contemporain.

✂----------

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Un siècle de géographie française
et d'histoire du Comité national de 1920 à nos jours

Avant-propos
Introduction : L'odyssée de la géographie française

***Première partie :* L'assise de la géographie française et l'essor du Comité national**

Chapitre 1. Origines et fondements du Comité National Français de Géographie
1. La reconnaissance institutionnelle de la géographie après 1870
2. La naissance du CNFG en 1920 à l'initiative de l'Académie des Sciences
Conclusion : La géographie consacrée

Chapitre 2. Essor de la géographie française et rayonnement international du CNFG
1. La géographie française à la conquête des universités
2. Le développement des instituts de géographie
3. Le rayonnement international de la géographie française
Conclusion : La géographie installée

Chapitre 3. Pionniers et grandes figures du CNFG : panthéon des présidents et secrétaires généraux
1. Le temps de l'installation et de l'enracinement (1920-1960)
2. Le temps de la transition et du changement (1960-1972)
3. Le temps de la consolidation et de l'unité (1972-2000)
4. Le temps de l'ouverture et du renouvellement (2000-2020)
Conclusion

***Deuxième partie :* Le CNFG et ses commissions en prise avec les évolutions de la géographie française**

Chapitre 4. Missions et actions du Comité National Français de Géographie
1. Les grandes missions du CNFG : fédérer, représenter, valoriser
2. Les grandes actions du CNFG : rayonnement national et international
3. Les partenaires du CNFG : acteurs et institutions
Conclusion : La géographie en action

Chapitre 5. Commissions thématiques du Comité National Français de Géographie : entre permanences et mutations
1. Des commissions de plus en plus spécialisées
2. Des spécialités emblématiques de la géographie
3. Des spécialités émergentes depuis les années 1970
Conclusion : Des commissions miroirs des évolutions de la géographie

***Troisième partie :* Le CNFG et l'avenir de la géographie française face au monde contemporain**

Chapitre 6. La géographie française à l'aube du nouveau siècle : célébrations et projets (2020-2022)
1. Le centenaire du CNFG en 2020
2. Le centenaire de l'Association de Géographes Français en 2020
3. Le bicentenaire de la Société de Géographie en 2021
4. Le centenaire de l'Union Géographique Internationale et le Congrès à Paris en 2022
Conclusion : La géographie célébrée

Chapitre 7. La géographie en résonance avec le monde actuel : intelligence spatiale et expertise territoriale
1. Le temps de l'intelligence spatiale
2. Les métiers du géographe et de l'expertise territoriale
3. Les perspectives du CNFG pour développer la géographie
Conclusion : La géographie pour comprendre un monde en mouvement

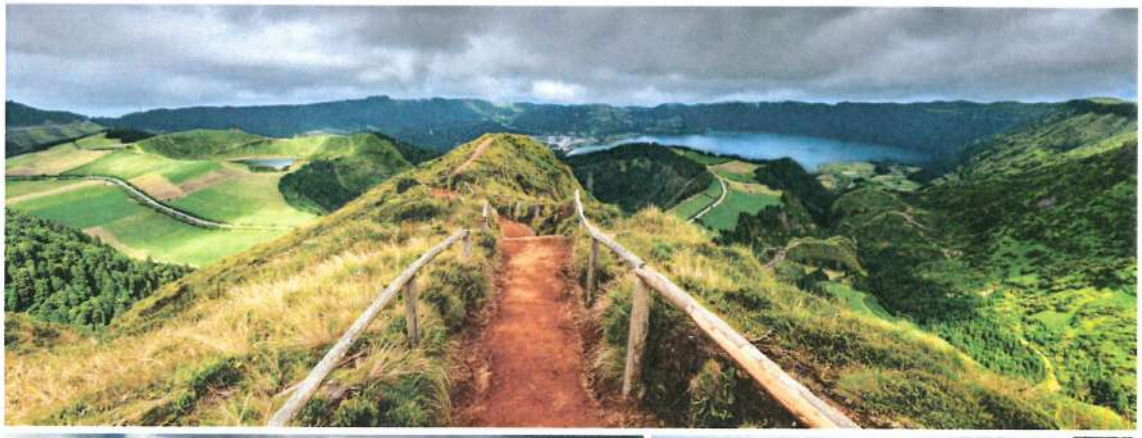
Marc GALOCHET (dir.), *Un siècle de géographie française et d'histoire du Comité national de 1920 à nos jours*. Paris, Comité National Français de Géographie, 2020, 300 p.

Souscription ouverte jusqu'au 10 novembre 2020

Annexe 2 : Sommaire de l'ouvrage The Geotourism industry in the 21st century

The GEOTOURISM INDUSTRY in the 21st CENTURY

The Origin, Principles, and Futuristic Approach



Editor **Bahram Nekouie Sadry**

CRC Press
Taylor & Francis Group
APPLE ACADEMIC PRESS

Apple Academic Press Inc.
4164 Lakeshore Road
Burlington ON L7L 1A4, Canada

Apple Academic Press Inc.
1265 Goldenrod Circle NE
Palm Bay, Florida 32905, USA

© 2021 by Apple Academic Press, Inc.

Exclusive co-publishing with CRC Press, a Taylor & Francis Group

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International Standard Book Number-13: 978-1-77188-826-4 (Hardcover)
International Standard Book Number-13: 978-0-42929-279-8 (eBook)

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Library and Archives Canada Cataloguing in Publication

Title: The geotourism industry in the 21st century : the origin, principles, and futuristic approach / edited by Bahram Nekouie Sadry.

Names: Nikū'ī Ṣadrī, Bahrām, 1973 or 1974- author.

Description: Includes bibliographical references and index.

Identifiers: Canadiana (print) 20200154311 | Canadiana (ebook) 20200154338 | ISBN 9781771888264 (hardcover) | ISBN 9780429292798 (PDF)

Subjects: LCSH: Ecotourism. | LCSH: Geotourism. | LCSH: Geoparks.

Classification: LCC G156.5.E26 N55 2020 | DDC 333.78/3—dc23

Library of Congress Cataloging-in-Publication Data

Names: Nikū'ī Ṣadrī, Bahrām, 1973 or 1974- editor.

Title: The geotourism industry in the 21st century : the origin, principles, and futuristic approach / edited by Bahram Nekouie Sadry.

Description: Burlington, ON ; Palm Bay, Florida : Apple Academic Press, 2020. | Includes bibliographical references and index. | Summary: "Here is an engaging overview of the development of, definition of, and approach to modern geotourism, a growing movement to help sustain and showcase the distinctive geographical characteristics of many places around the world. This volume, The Geotourism Industry in the 21st Century: The Origin, Principles, and Futuristic Approach, provides a clear conceptual framework with illustrative examples from all corners of the world to better understand abiotic nature-based tourism. The volume looks at the establishment and effective management of the over 130 UNESCO geoparks around the world and other travel and tourism destinations of interest for their significant historical, cultural, and frequently stunning physical attributes. With studies from a selection of geotourist areas in Poland, Japan, Turkey, Brazil, Albania, California, Mexico, Peru, and other places, the volume explores urban geotourism, mining heritage, geomorphological landforms, geoheritage (based on cultural and historical interest), roadside geology of the U. S., community engagement and volunteer management programs, and much more. There is even a chapter on space and celestial geotourism. The volume encourages academics, practitioners, and students in the fields of tourism, geology, geography, and also environmental and conservation science to learn more about the geopark movement and this arising new discipline. Key features: Provides guidance for all aspects of geotourism as it relates to the establishment and effective management of geoparks Offers specific information on the geo-conservation and effective management of geotourism in geoparks Identifies significant geological and mining heritage areas that could be formally reserved as national geoparks or geosites by nations Provides a model and schematic mechanism for integrating geodiversity into all relevant geotourism activities and also to geoheritage stakeholders, such as UNESCO, the mining industry, and others"-- Provided by publisher.

Identifiers: LCCN 2019057666 (print) | LCCN 2019057667 (ebook) | ISBN 9781771888264 (hardcover) | ISBN 9780429292798 (ebook)

Subjects: LCSH: Geotourism--Case studies.

Classification: LCC G155.A1 G426 2020 (print) | LCC G155.A1 (ebook) | DDC 338.4/791--dc23

LC record available at at https://lccn.loc.gov/2019057666

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DEDICATION

This book is dedicated to the Nekouie Sadry family;

And to:
All my mentors, who inspired me through their books and speeches;
My kind friends who encouraged and supported me;
My keen students who were a source of motivation to me;

And:
To all hard-working researchers, executives, and managers who endeavor to alleviate poverty and who popularize geoscience through developing geotourism and geoparks around the world.

About the Editor

Bahram Nekouie Sadry, PhD
Adjunct Senior Lecturer and Geotourism Consultant

Bahram Nekouie Sadry, PhD, is an Adjunct Senior Lecturer and a Geotourism Consultant. Dr. Sadry conducts research in the fields of geotourism, ecotourism, and wildlife tourism and heritage interpretation. He has published several books and textbooks on geotourism and has undertaken geotourism consultancy projects for the private sector. He is also an education consultant and a curriculum developer on tourism and geotourism in higher education and has conducted geo-tour guide training courses for his national government. Dr. Sadry is deeply involved in the development of geotourism and is a passionate advocate for the creation of national geoparks and UNESCO Global Geoparks around the world. He holds a BE degree (Mining Eng.), MSc (Geography), and PhD (Educational Administration).

Contents

Contributors ..... *xiii*

Preface ..... *xxiii*

Foreword 1 by Thomas A. Hose ..... *xxv*

Foreword 2 by William (Bill) Witherspoon ..... *xxix*

Acknowledgments ..... *xxxiii*

Part I: Geotourism Concepts in the 21st Century **1**

1. The Scope and Nature of Geotourism in the 21st Century **3**
Bahram Nekouie Sadry

2. Historical Viewpoints on the Geotourism Concept in the 21st Century **23**
Thomas A. Hose

3. Urban Geotourism in Poland **93**
Krzysztof Gaidzik

4. Mining Heritage as Geotourism Attractions in Brazil **117**
Antonio Liccardo, Virginio Mantesso-Neto, and Marcos Antonio Leite do Nascimento

Part II: Geoassessments: Geoheritage Assessments for Geotourism **145**

5. Geomorphosites: Esthetic Landscape Features or Earth History Heritage? **147**
Emmanuel Reynard

6. Geoheritage and Geotourism in Albania **169**
Afat Serjani

7. Establishing an Appropriate Methodology for the Management of Geological Heritage for Geotourism Development in the Azores UNESCO Global Geopark **189**
Eva Almeida Lima and Marisa Machado

8. "Simply the Best": The Search for the World's Top Geotourism Destinations **207**
Murray Gray

Part III: Geointerpretation: Interpreting Geological and Mining Heritage 227

9. Interpreting Mining: A Case Study of a Coal Mine Exhibit 229
Ted T. Cable

10. Geotrails 247
Thomas A. Hose

11. Interpreting Geological and Mining Heritage 277
Ross Dowling

12. Evolving Geological Interpretation Writings about a Well-Traveled Part of California, 1878–2016 299
William (Bill) Witherspoon

13. Commercially Successful Books for Place-Based Geology: Roadside Geology Covers the US 325
William (Bill) Witherspoon and John Rimel

Part IV: Geoparks and Community Developments: A Base for Geotourism Promotion 355

14. Community Engagement in Japanese Geoparks 357
Kazem Vafadari and Malcolm J. M. Cooper

15. The Role of Volunteer Management Programs in Geotourism Development 375
Cristian Ciobanu and Alexandru Andrășanu

16. Geotourism and Proposed Geopark Projects in Turkey 387
Gülpinar Akbulut Özpay

17. Geotourism Development in Latin American UNESCO Global Geoparks: Brazil, Uruguay, Mexico, and Peru 421
José Luis Palacio Prieto, César Gosso, Diego Irazábal, José Patrício Pereira Melo, Francisco do O'de Lima, Júnior, Carles Canet, Miguel A. Cruz-Pérez, Erika Salgado-Martínez, Juan Carlos Mora-Chaparro, Krzysztof Gaidzik, Jerzy Żaba, and Justyna Ciesielczuk

Part V: Globalization and the Future of Geological Attraction Destinations 447

18. Dinosaur Geotourism: A World-Wide Growing Tourism Niche 449
Nathalie Cayla

19. Accessible Geotourism: Constraints and Implications 473
Mamoon Allan

20. Space and Celestial Geotourism 481
Bahram Nekouie Sadry

21. Post-Mining Objects as Geotourist Attractions: Upper Silesian Coal Basin (Poland) 507
Krzysztof Gaidzik and Marta Chmielewska

22. Geotourism vs Mass Tourism: An Overview of the Langkawi UNESCO Global Geopark 527
Kamarulzaman Abdul Ghani

23. The Future of Geotourism 535
Bahram Nekouie Sadry

***Index*.....553**

Foreword 1

It is less than 25 years since the first formal definition of geologically/geomorphologically based modern geotourism was published. Geotourism provision essentially gives travelers (or geotourists) the opportunity to acquire knowledge and understanding of a destination's Earth history, geological elements, and landscapes. Indeed, across most of the world, geotourism has long been considered a geologically focused form of tourism. Perhaps, surprisingly, its antecedents can be traced back to at least the 17th century. By promoting and imparting something of the wonder of geoscientific inquiry and its outputs, geotourism can engender amongst its participants sufficient empathy to motivate their support for the protection and conservation of geodiversity and geoheritage, that is, "geoconservation." Both modern geotourism and geoconservation, alongside practitioner reportage, have from the early 1990s attracted academic study and consequently evolving managerial and theoretical underpinnings.

The seminal 1995 geotourism definition, published in *Environmental Interpretation* magazine, following further research and reflection, was subsequently revised several times by its author. That author has freely acknowledged that others—particularly in Australia, China, and Europe—had either mentioned "tourism geology" or something similar but had generally not indicated any specific meaning of their terms; their mentions with the associated studies really helped to lay the groundwork for modern geotourism's widespread acceptance as a new paradigm.

The first dedicated national geotourism conference, *Tourism in Geological Landscapes*, was held in Belfast at the Ulster Museum in 1998. *The Inaugural Global Geotourism Conference*, much practitioner focused, was held only a decade ago in Fremantle, Australia. The first international conference on the history of geotourism, *The Appreciating Physical Landscapes: Geotourism 1670–1970* conference, was held in London at the Geological Society as recently as 2012. Meanwhile, *The First International Conference on Geoparks* was held in Beijing in 2004.

The emergence of modern geotourism and the provision of geosites and geomorphosites interpreted for tourists both predate, by at least a couple of decades, the designation of the first geoparks; the latter can be standalone ensembles of geosites and geomorphosites or part of some national or

international designation. The first geoparks were established in Europe in 2000. Significantly, UNESCO's original Geoparks Programme Feasibility Study report of that year included the seminal geotourism definition and its major concepts. Formal designation as a member of Global UNESCO Network of Geoparks network has been available since 2004. Although geoparks were initially a European development, it is in Asia that they have particularly expanded in numbers and popularity. For example, the People's Republic of China has more than a quarter (31 of 111) and the region had over a third (39 of 111) of the UNESCO Global Geoparks designated by the mid-2010s; additionally, that country had by then designated 185, and recognized another potential 56, National Geoparks. Geoparks have done much, and more significantly than any other single initiative, to promote and develop geology-based tourism. Indeed, to maintain their UNESCO geopark membership, they must offer interpretative services. Probably the greatest contribution of geoparks is their requirement to engage with the broader, especially local and business, than just the Earth science communities. They are one of the success stories of 21st-century sustainable tourism, something for which their proponents are to be congratulated.

Modern geotourism provision meets geotourists' needs by encouraging them to visit localities with spectacular or readily appreciated, and usually (on-site and/or off-site) interpreted, geological/geomorphological features. These features are often more readily, at least in the marked seasonal climates of Europe and North America, seen outside of the major vegetation growth period; hence, potentially it can extend the tourism season in some coastal and upland areas. Of course, the appreciation of physical landscapes and the extraction of their mineral resources has been a pragmatic human activity, long before the recognition and practice of geotourism, especially for the purposes of agriculture, construction, and metallurgy; evidence for this can be found in both the archaeological and historical records.

The breadth of geotourism's encompass is clear from the preceding paragraphs. They suggest that any attempt to summarize this breadth of geoscience and its tourism component in a single book is a major and challenging undertaking. This book's 23 chapters are spread across five sections covering geotourism's concepts, assessment, interpretative provision, geoparks, and its global future. They have been contributed by an international assemblage of 35 authors, each contributing from their own perspectives and experiences. The various authors explore the spectrum of modern geotourism provision, practice, and development. The range of topics covered range from urban tourism to the world's best geosites and from mining geoheritage

to geotrails and interpretative writing. The included case studies, geographically spread from Albania to the Azores and the Americas to Japan, indicate the variety and wide distribution, geographically and by type, of modern geotourism provision. The diversity of views expressed in these chapters, helpfully summarized by the Editor, challenges readers to engage in studies to further understanding and disseminating geotourism beyond its current strongholds.

This book is a timely contribution to studies on the status and practice of modern geotourism. Its publication would not have been realized without the personal vision, wide connections, organizational skills and perseverance of the Editor, Bahram Nekouie Sadry. Fellow students of geotourism and the wider readership of geography and tourism specialists owe him, for this sterling effort, a considerable debt of gratitude—one which I am most happy to wholeheartedly express. As Bahram suggests in the book's opening sentence "Geotourism is an emerging and promising field for enjoyable and meaningful experiences in contemporary tourism." Similarly, this book is an enjoyable read and will add understanding and meaning to its readers' own geotourism experiences!

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March 2019

Foreword 2

This is an important book because it brings together the interpretive and management aspects of geotourism on a global scale. It reveals geotourism's potential to popularize the fundamentals of geoscience and open up new pathways of sustainable economic development. Through his own chapters and those of the authors he has invited, Dr. Sadry has conveyed his global knowledge of the geopark movement and the art of geoscience interpretation.

For me as an American geologist, geoscience educator, *Roadside Geology* coauthor, and chapter author in this book, it is my first introduction to the terms geopark, geosite, or geomorphosite. This may be an example of the cross-fertilization a work of this scope can achieve, for example, inspiring its US readers to advocate for our country joining UNESCO's geopark system.

People know some aspects of nature in their bones. Scanning the night sky, they know that the Moon is Earth's neighbor and the stars are far, far away. In contrast, awareness is rare that shapes of hills area snapshot result of continuing Earth processes, while the bedrock is a legible record of many moments in the unimaginably distant past. This book offers the hope that in a well-interpreted geopark, visitors will get "deep time" and Earth processes into their bones, the way we geologists experience them.

I first heard the word geotourism in the late 1970s from my PhD advisor, Professor Dietrich Roeder. He is credited with, in 1969, introducing the word "subduction" from the Alpine literature into its present plate-tectonic sense. Though German was his native language, you only knew that because his English was "too good." He was playful in his use of it. Geotourism for him described the pleasure of blending geologic insights along the roadside with awareness of the geology's connections to local nature and culture.

The geotourism concept inspired me in 2001 to take some Georgia teachers to the Grand Canyon. I wanted my group to internalize the canyon's lessons on Earth processes and deep time. Was it possible to build the story up piece by piece on the drive from Phoenix Airport to our destination? Though I did not know the word "geosites" until I read this book, such sites were my answer. In *Roadside Geology of Arizona* by Halka Chronic, I learned that nearly the whole sequence of layers seen in the Grand Canyon is exposed in road cuts heading north from Payson, a town about 90 miles northeast of Phoenix. Four miles from Payson, in a county park and nearby road cut, you

can lay a hand on the Great Unconformity, with your thumb on a 1.6-billion-year-old rock that represents the roots of a mountain chain planed flat by erosion. Your fingers touch sandstone layers from the Cambrian Period, when life with shells first appeared, more than a billion years later. A perfect geosite to create a memorable experience, but with neither sign nor park brochure to mention it.

In the 21st century, the need for bone-deep awareness of Earth processes is greater every day. Without it, people are prone to imagining that scientists are only guessing when they say that burning coal is raising global temperatures, or that mostly gradual changes to landscapes and climate enabled the evolution of whales, tree frogs, and people. Admittedly, much progress could be made if politicians would finally yield to expert advice that geoscience in school needs equal emphasis with chemistry, physics, and biology. But this book offers an additional vision. Imagine putting the "Great Unconformity" in a starring role in a geopark promoted as a tourist attraction. Imagine, too, the local economic benefits of opening this new front of popular attention.

In 2012, I wanted to help teachers and others internalize plate boundary processes in a trip to California to be called "Geology on the Edge." I thought to promote it using Professor Roeder's word "geotourism." Having the internet by then, I searched for the term. To my surprise, Wikipedia informed me that a team with the blessing of the *National Geographic Society* had lassoed it as a synonym for sustainable tourism, with only incidental Earth science significance. Fortunately, I persisted to find a blog by Dr. Sadry that identified geotourism as a parallel concept to ecotourism, distinguished as "abiotic nature-based tourism."

The phrase "abiotic nature" seems strange at first. From the outer edges of Earth's atmosphere to the deepest mines and drill-holes, it is now clear that some form of life is ever present. Even the first tourist in space, Dennis Tito, whom Dr. Sadry mentions in his intriguing "Space and Celestial Geotourism" chapter, brought biota with him. But ecologists use "abiotic" abstractly for the nonliving components of the larger Earth system. Without them, life could not exist. If we fail to preserve Earth's favorable abiotic features, its special atmosphere, hydrosphere, and geosphere, we fail to preserve ourselves.

Having found his blog, I emailed Dr. Sadry to ask how I could help support his meaning of geotourism. One eventual answer was his invitation to write a chapter (which became two) for this book. Being further asked to write this Foreword gave me the opportunity to review his entire labor of love, this book, filling in numerous gaps in my knowledge of geotourism.

In these chapters, you will read about successes and challenges in several countries with setting aside localities for geotourism. Whether carved out

by glaciers and rivers, or miners' dynamite and pickaxes, rock outcroppings attract visitors, and tourism can help local economies.

Reading on, you will learn of the tradeoffs between signage, leaflets, and digital media in conveying geoscience concepts. You will experience the tension between the often-lucrative enterprise of selling access to nature's joyrides, and the challenging and sometimes costly work of imparting wisdom in the ways of the planet. And you will see that like its sister activity, ecotourism, geotourism includes both keeping local people invested as volunteers and beneficiaries, and managing resources, so that we visitors do not love a place to death.

Regarding education by firsthand experience, in the 19th century, American geologist James McFarlane summed up geotourism's potential (his italics):

> to teach persons not versed in geology … not as in a textbook, but by pointing to the things themselves … *There are some kinds of knowledge too that cannot be obtained from books, but must be gathered by actual observation.*

This book will help geopark managers, geoscience educators, and all researchers and students of geotourism to use those "things themselves" to instill bone-deep awareness of how the planet works. It will also help them use geotourism to create economic value for alleviating poverty while protecting resources for future generations. Thank you, Dr. Sadry, for having the knowledge, vision, and energy to bring it all together.

—William (Bill) Witherspoon, PhD, PG
Retired Geologist Leading Walks and Talks
Co-author, Roadside Geology of Georgia
March 2019

PART I

Geotourism Concepts in the 21st Century

CHAPTER 1

The Scope and Nature of Geotourism in the 21st Century

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ABSTRACT

A brief introduction to the history of geological tourism and the definition of modern geotourism are given. The boundaries as well as the theoretical and experimental definitions of geotourism are discussed in this chapter. The theoretical framework about geotourism principles and its development are proposed. The structure and contents of the new book are reviewed.

1.1 INTRODUCTION

Geotourism is an emerging and promising field for enjoyable and meaningful experiences in contemporary tourism. Geological tourism has a history of over a hundred years in some countries, including England, Australia, Iceland, and so on. To illustrate, geology-based tourism in England is said to be rooted in the last years of the 17th century (Hose, 2008), and many visitors to Iceland during the 18th and 19th century mentioned the geological features as their primary reason to visit the country (Ólafsdóttir and Tverijonaite, 2018). So, the emergence of geological tourism in other countries was probably around the same time (e.g., Gray, 2004; Turner, 2013). The co-author of *Roadside Geology of Georgia*, William Witherspoon (2012) has uttered that "[in the USA], I have been hearing the term geotourism since the 1970's, in the sense of geological tourism" (W. Witherspoon, pers. comm., July 16, 2012), but modern "geotourism" only appeared for the first time discussed by Hose (1994) in the first focus of university research and the academic literature in 1994, and was first then defined by Hose (1995),

gaining credibility with its acceptance by UNESCO's Earth Sciences division in 2000 and with the 2009 launch of the "peer-reviewed Journal of Geoheritage" (Hose, 2012).

The *Geoheritage journal* is an international journal exploring all aspects of our global geoheritage, both in situ and portable. According to Coratza et al. (2018 and all references therein) two terms that are being utilized more and more regularly have been made known in scientific terminology: "Geoheritage" and "Geodiversity"; More recently, Geotourism as tourism related to geoheritage and geodiversity and all in all, tourism related to abiotic nature appeared (e.g., Hose, 1995, 2016; Gray, 2004; Sadry, 2009; Reynard et al., 2009; Newsome and Dowling, 2010; Farsani et al., 2012; Reynard and Brilha, 2018; Dowling and Newsome, 2006, 2010, 2018). Therefore, over the past 15 years, geotourism has developed from an unknown niche trend to an approach in tourism planning and for abiotic nature conservation, especially with highlighting the UNESCO sponsored global geopark movement in the 21st century. Geotourism is somehow selling the story and beauty of a country's rocks, which is noticeable in quite extensive subsectors, such as "Rural geotourism" (Farsani et al., 2013), Urban geotourism (Hose, 2006; Sadry, 2009; Riganti and Johnston, 2018; Del Lama, 2018; Gaidzik (Chapter3)), Celestial geotourism (Chapter 20 in this book) and Space geotourism (Chapter 20 in this book), Roadside geotourism (e.g., Sadry, 2009; Strba et al., 2016; Witherspoon and Rimel (Chapter 13 in this book)), Community-based geotourism (Turner, 2005; Mukwada and Sekhele, 2015), Underground and cave geotourism (Garofano, 2018), Submarine geotourism (e.g., Lima et al., 2014), Dinosaur geotourism (Turner, 2004; Cayla (Chapter 18)) even Meteorite geotourism (Chapter 20); Mining geotourism: one particular type of tourism related to mining heritage and mine sites (e.g., Hose, 2006; Sadry, 2009; Garofano and Govoni, 2012; Mata-Perelló et al., 2018; Gaidzik and Chmielewska (Chapter 21)); Adventure geotourism (e.g., Sadry, 2009; Farsani et al., 2013; Newsome and Dowling, 2018: 477), Volcanic geotourism (e.g., Erfurt-Cooper and Cooper, 2009; Woo et al., 2010; Hose, 2010; Dowling, 2010; Cooper and Eades, 2010; Turner, 2013; Erfurt, 2018) and, according to Erfurt-Cooper and Cooper (2009), connected geotourism with volcanic geotourism phenomena which consists of thermal springs (the springs of natural hot water, which are extensively used in health tourism, e.g., Turner, 2005); incorporating such hot springs to regular events held annually is also quite common in some countries (e.g., Japan and Indonesia). "Many resorts benefit from these spas for health and wellbeing reasons, which is especially common in Iceland, Japan and New Zealand, where there are numerous active volcanoes offering

an amazing scenery for visitors experiencing the spas. In this respect, the preservation, sustainability and education of various geosites is particularly based on volcanic heritage" (Erfurt-Cooper and Cooper, 2009, 2014). Therefore, in the 21st century, geotourism subsectors are unique and broad enough so that they deserve direct management, planning and marketing by specialized institutions as well as purposeful research. It is sometimes convenient to utilize one of these products which are highly specialized, at a larger geotourism or tourism scale; however, it would depend on the aims of the related companies. To accomplish this, the perfect essence or three key elements of geotourism (Sadry, 2013) are:

1. Abiotic nature as the main attraction;
2. Geological heritage interpretation[1]; and
3. Positive outcomes for nature (and locals).

Also, in a parallel manner, according to Weaver (2011) the core ideals of ecotourism are: meaningful participant learning and maximization of positive ecological and sociocultural impacts.

Hence, the core ideals of geotourism can also be developed in a similar manner comprising: meaningful participant learning and maximization of positive geological and sociocultural impacts. The present chapter intends to enhance the understanding of the geotourism industry as an outstanding subsector of the wider tourism industry, which truly deserves special attention from academics and related organizations. Meanwhile, geotourism activities should control tourism's rising interactions with abiotic nature and especially geological heritage.

The first section below defines the term "geotourism" and proposes a theoretical frame for geotourism principles. Following this, a review of the structure and contents of the book is discussed.

1.2 TOWARD A DEFINITION OF GEOTOURISM

According to Newsome and Dowling (2010: 4) "a more specific definition of geotourism helps to develop a focused strategy, which is fundamental in accomplishing the objects of geotourism. It includes geodiversity conservation, visitor education, and empowering local communities by providing knowledge about their geological resources and employment opportunities." There are five elements of the definition of geotourism in more specific ways (see Fig. 1.1).

[1] Also, see Chapters 9 (based on the 15 principles in interpretation), 11 (ABC approaches in geointerpretation), and 23 of this book.

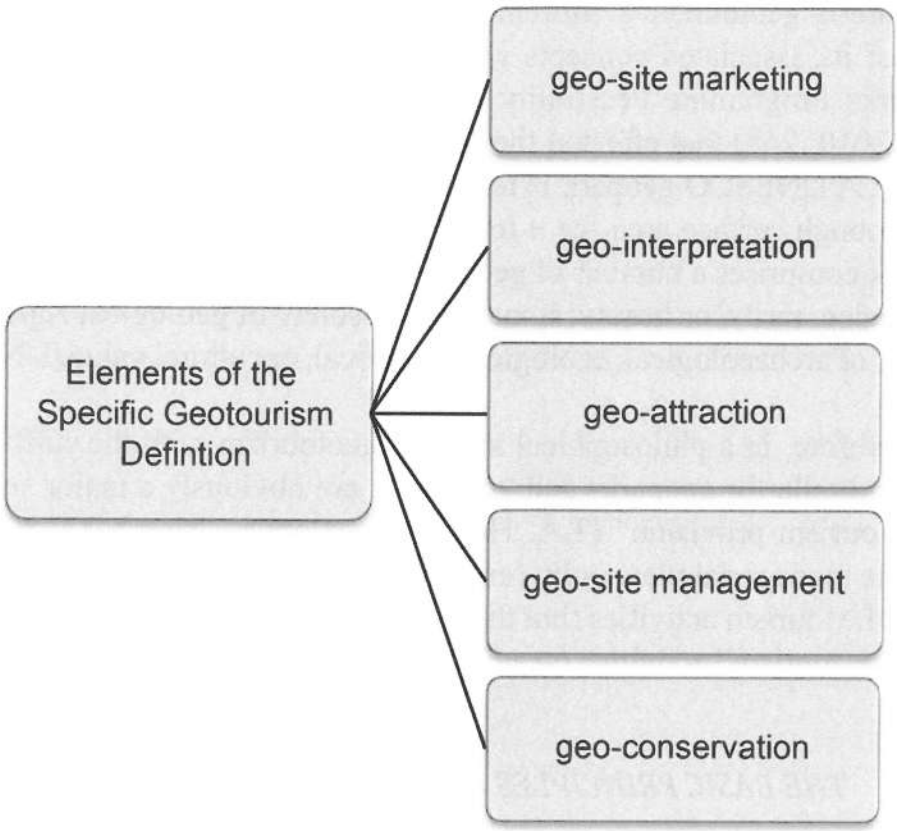

FIGURE 1.1 The five elements of the definition of geotourism in more specific ways.
Source: Materials adapted from Newsome and Dowling (2010: 4).

1.2.1 TRUE GEOTOURISM

"Modern tourism originated after the 1840s. It is just 60–70 years since geographers began to study modern tourism from a geographical perspective, and *Relationship between Recreational Activities and Land Use* by K.C. McMurry was generally recognized as the first work of geographers studying modern tourism" (Chen et al., 2015). Although it has long been recognized that tourism and geological background of our environment are inextricably interwoven, it is generally accepted that the first widely published definition of geotourism in the modern era was coined and began, hence, by the "father" of geotourism, Thomas A. Hose in 1995 as

The provision of interpretative and service facilities to enable tourists to acquire knowledge and understanding of the geology and geomorphology of a site (including its contribution to the development of the Earth sciences) beyond the level of mere esthetic appreciation (Hose, 2006: 221) (see Fig. 1.2).

Modern geotourism's aforementioned original definition along with some of its associated concepts was integrated within the UNESCO 2000 Geoparks Programme Feasibility Study (Patzak and Eder, 1998 cited by Hose, 2010: 268) that effected the movement of global geoparks in the 21st century. A UNESCO geopark is territory with well-defined limits that has a large enough surface area for it to serve local economic development. The geopark comprises a number of geological heritage sites of special scientific importance, rarity, or beauty; it may not be solely of geological significance but also of archaeological, ecological, historical, or cultural value (UNESCO, 2000).

Therefore, in a philosophical manner, geotourism with the suffix (-ism) is an umbrella for geoparks and "geoparks are obviously a major subsector of geotourism provision" (T.A. Hose, Pers. Comm., March 23, 2019) but from the managerial view point (exactly for practitioners) geotourism is just one of the tourism activities (but the main one) within geoparks among other "geopark tourism" activities (see Fig. 1.3).

1.2.1.1 THE BASIC PRINCIPLES OF GEOTOURISM

The basic principles of geotourism consist of tourism promotion, geological conservation measures, community benefits, and stakeholders' involvement. For a planning strategy to be effective, the aforementioned four components must be used correctly (see Fig. 1.2).

1.2.2 "TOURTELLOTIC GEOTOURISM": A TAG FOR DESTINATIONS

Witherspoon (2018) states that "the geologist I clearly remember using this word [geotourism] in the 1970s was my mentor, Dietrich Roeder, who coincidentally also had brought the term 'subduction' into the plate tectonics lexicon" (W. Witherspoon, pers. comm., Dec. 15, 2018). Also he previously mentioned that "the 1995 definition you cite [from Thomas A. Hose in 1995 who first defined the term geotourism in the globe] is older than the very different definition that the Wikipedia article cites [Jonathan Tourtellot's geographical sustainable tourism charter & concept] dating back to 2002. And taking over a useful term [Geotourism] purely as a brand name is a *shame*" (W. Witherspoon, pers. comm., July 16, 2012). Unfortunately, recent usage of the same coined word "geotourism" by Jonathan Tourtellot, senior editor of National Geographic Traveler is not a new subsector of tourism

industry in the 21st century, "with no focus on geodiversity" (Necheş and Erdeli, 2014); and according to Ólafsdóttir and Tverijonaite (2018), National Geographic and its so-called Geotourism Map Guides just seek to inform visitors concerning the more sustainable choices provided in each area, thereby helping to enhance the region's geographical character and contributing to the well-being of local people.

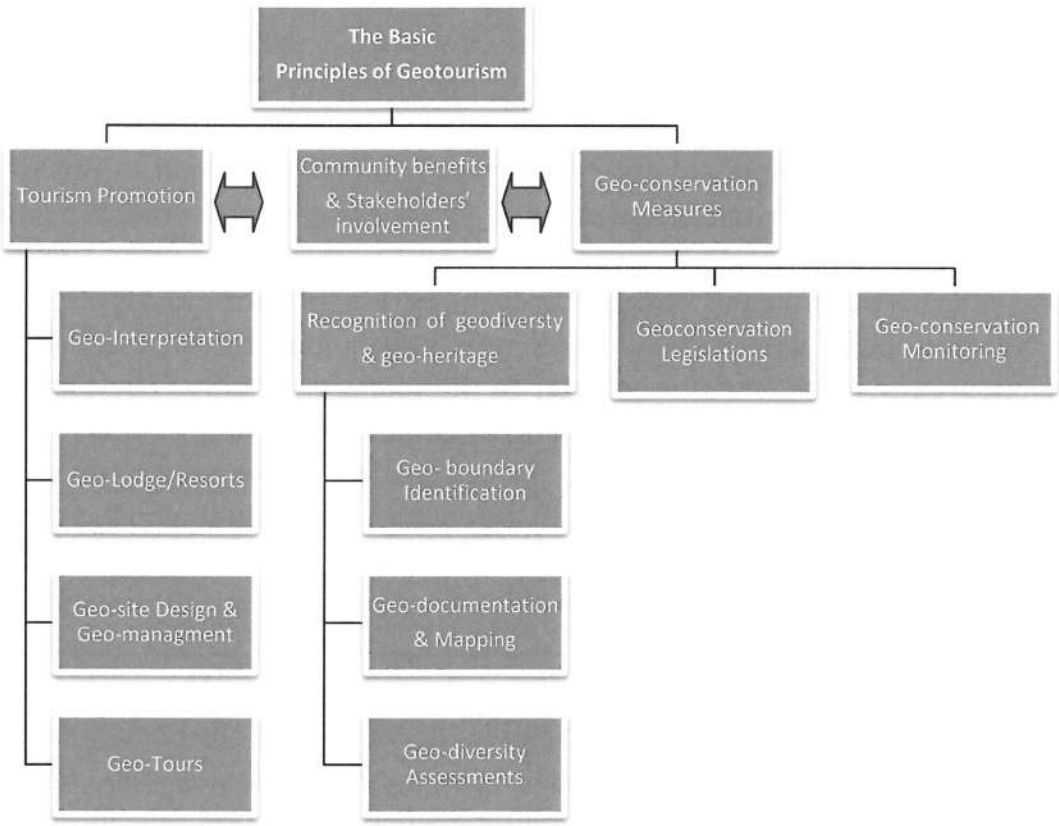

FIGURE 1.2 Geotourism principles and their promotion codes within geoparks and individual geosites (as geotourism sites).

Source: Own construction; some materials adapted from Gray, 2004; Dowling and Newsome, 2006, p 5; Hose, 2006; Sadry, 2012, 2013.

Fortunately it is sustainable tourism principles and a new comprehensive strategy for sustainable tourism for any destinations and a related "charter and concept promotes behaviors such as buying local products, improving employee well-being, and donating to local causes" (Jorgenson and Nickerson, 2016) and this is just a *broad* term that covers all *tourism.* Also it is an excellent strategical device to change mass tourism to sustainable forms in the 21st century. Indeed, "*National Geographic* has spread use of the word

'geotourism' as shorthand for 'geographical sustainable tourism,' which is outlined in a charter document and in more recent interviews, Jonathan Tourtellot increasingly uses 'destination stewardship,' which would be a far more appropriate tag for the charter." Destination stewardship is indeed of critical importance, when so many of the world's special places are being 'loved to death.' Use of "geotourism" to mean "destination stewardship" ought to be ended, because it causes confusion with a prior use of the term, as a category of nonliving nature-based tourism. Geotourism is a sister category to ecotourism, which informs the traveler about a destination's ecology of living systems. Geotourism teaches the traveler about a location's Earth history, rock types, and landscapes. By increasing the visitors' sense of wonder, both ecotourism and geotourism can motivate them to practice destination stewardship. This must not be swept aside by obscuring the term "geotourism" with a less appropriate use (W. Witherspoon, pers. comm., Dec. 15, 2018). We can't change the name of the tourism industry, which is internationally well-known, to the geotourism industry on the pretext of integrating a sustainability charter to the tourism industry. The tourism industry would entail its own name and a brilliant sustainable charter.

Tourism science would develop its independent subsegments for interpretation, attractions, marketing, management, and nature conservation. More recently, adding "geology" to the holistic concept and definition of the approach taken by National Geographic in the Arouca declaration have been reiterated to take this approach by José Luis Palacio Prieto and his colleagues (Chapter 17) in this book. As they noted that: "More recently, geotourism (as a modality of geographical sustainable tourism) was defined as 'tourism which sustains and enhances the identity of a territory, taking into consideration its geology, environment, culture, esthetics, heritage and the well-being of its residents' (Arouca, 2011). Undoubtedly, geological heritage is a key component of the geotourism offer of the geoparks referred to herein, with the relationship between geological heritage with other types of heritage—both natural and cultural—as major factors." And added that "This chapter does not provide an in-depth discussion of these two perspectives, although geotourism activities in Latin American geoparks are compatible with both."

According to Reynard (Chapter 5 in this book), "some authors (e.g., Hose, 2016: 6) consider that the Declaration has added confusion more than solved the problem," that emerged from National Geographic side (see Hose (Chapter 2 in this book, for more discussion, to avoid confusion and more probably to close the debate)).

1.2.3 CLARIFYING THE SITUATION

1.2.3.1 COMMON CONFUSION: ASSUMING GEOTOURISM AND GEOPARK AS EQUIVALENT

Following the correspondence with geopark executives, and also considering the previous educational and consulting experiences of the author, as is mentioned in Chapter 17 of the book, considering geoparks and geotourism as equivalents among geopark executives and even sometimes among researchers, is quite prevalent. This may cause confusion in written articles, book chapters, and in using different concepts. For instance, when geotourism and geopark are taken as synonyms, a holistic definition of geotourism covers more attractions. So, geoparks would be more successful and diverse. This is a common mistake by geopark executives intending to be more successful in managing a geopark. While geotourism is an independent scientific and research subsector in itself and by considering the fact that geoheritage and local community are essential in order for the geopark to be registered, the development of other forms of tourism in geoparks is not only permitted but also would add to the diversity of the geopark, the attractions, and the revenues. Another benefit of incorporating other forms of tourism into geoparks would be enhancing the attractiveness and economic success of such areas. Geotourism is a central part of geoparks but in addition to geotourism other types of sustainable tourism using other diversity and heritage of a region are applicable. In most geoparks around the world, other forms of tourism such as ecotourism (e.g., The Langkawi UNESCO Global Geopark in Malaysia; see Chapter 22), agricultural tourism (e.g., a "GIAHS/Geopark" site like Kunisaki Peninsula in Japan; see Chapter 14), wildlife tourism (e.g., whale watching in the Azores UNESCO Global Geopark in Portugal; see Chapter 7), cultural tourism, and so on alongside geotourism as foundation to a geopark, are promoted and related products are supplied for the visitors, which has added to the diversity of the geopark. Also, "geotourism is the vehicle for geoparks leading to the important UNESCO recognized global geopark criterion of sustainable development" (Newsome and Dowling, 2018: 478). As a result, geotourism is one of the tourism components of the UNESCO recognized global geopark criterion of sustainable development (see Fig. 1.3). Since geotourism has its own conceptualization and its own geoproducts, the definition of geotourism should be narrowed down and become more specific like abiotic nature-based tourism.

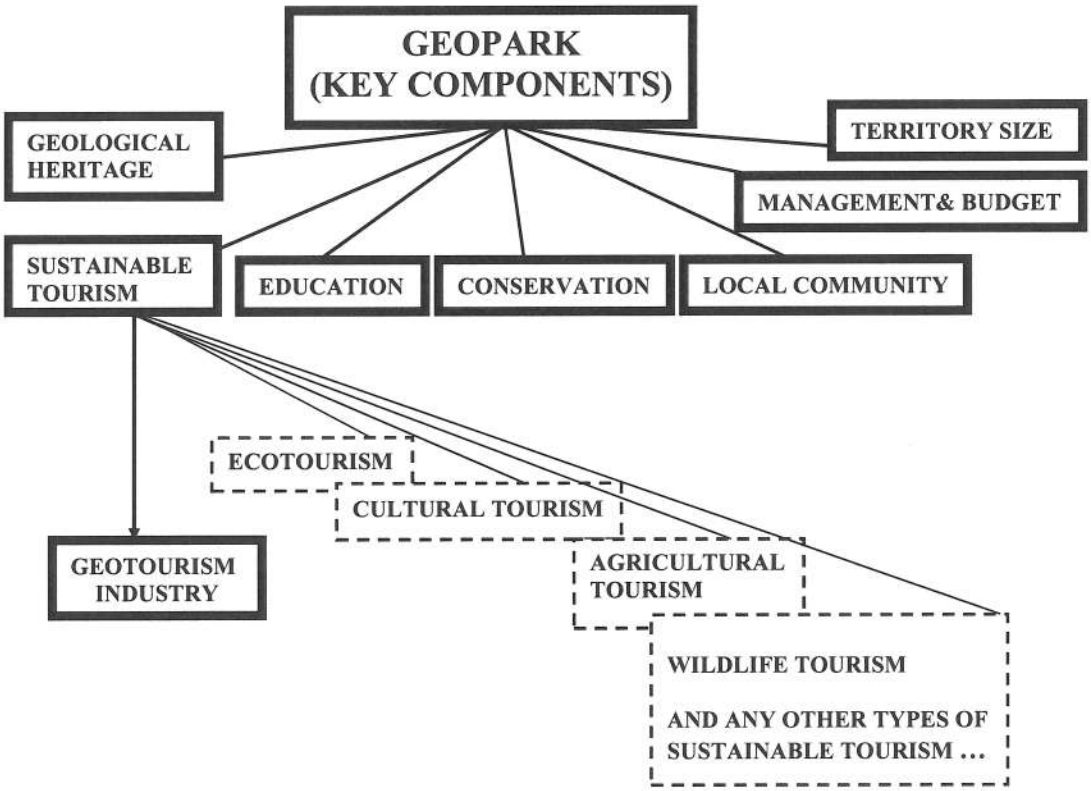

FIGURE 1.3 The core elements and key components of a geopark. Other forms of tourism within geoparks, as noncentral components, dashed.

Source: Materials adapted from UNESCO, 1999, 2000 and GGN Guidelines, 2010.

1.2.3.2 GEOTOURISM DEFINITION IN THE 21ST CENTURY

According to Ólafsdóttir and Tverijonaite (2018) researchers emphasize the importance of narrowing the definition of geotourism to geology and its conservation, pointing out that applying a broader approach to geotourism might reduce the impact of the concept. To clarify the situation, I propose the following definitions as conceptual and practical definitions:

a. A Conceptual Definition (Sadry, 2009: 17):
It is knowledge-based tourism, an interdisciplinary integration of the tourism industry with conservation and interpretation of "abiotic nature" attributes, besides considering related cultural issues, within the geosites for the general public.

b. A Practical Definition (Newsome and Dowling, 2010: 4):
Geotourism is a form of natural area tourism that specifically focuses on geology and landscape. It promotes tourism to geosites and the conservation of geodiversity and an understanding of Earth sciences through appreciation and learning. This is achieved through in dependent visits to geological features, use of geotrails and view points, guided tours, geoactivities, and patronage of geosite visitor centers.

1.3 STRUCTURE AND CONTENTS OF THIS BOOK

This book comprises 23 chapters written by 35 authors from different countries around the world. Topics of different areas, including various samples and case studies, are covered so it enhances our understanding of geotourism as a distinct form of tourism, which is becoming a rising issue all over the world.

Chapter 2 (Thomas Hose) examines historical viewpoints on the geotourism concept. He fully discusses the history surrounding the definition of geotourism from Asian "definitions," Chinese thoughts on geology-related tourism, Australasian and European definitions to historical aspects of geointerpretation in detail. Hose's emphasis on the historical roots of geotourism includes geosites and geomorphosites and artistic outputs, and so on. He finishes by suggesting that recognition of geotourism, recent development, and history can and should be placed within a broader tourism history context.

In Chapter 3, Krzysztof Gaidzik outlines the opportunities and challenges for urban geotourism in the Polish small-sized towns to large cities like Kraków, Kielce, and Wrocław. He argues that the combination of urban tourism with geo-education are recognized by local governments as a great idea for promoting tourism in the town. He suggests that the geology of cities and town provides geo-educational elements for development of urban geotourism to visitors.

From Poland to Brazil, where Antonio Liccardo, Virginio Mantesso-Neto, and Marcos Antonio Leite do Nascimento (Chapter 4) discuss the relevance of Mining Heritage Attractions to promotion of geotourism. They present six cases chosen throughout Brazil that considered as cultural heritage. These sites are in the OuroPreto, Diamantina, Chapada Diamantina, Ametista do Sul, Pedro II, CurraisNovos as well as Itu, which allow geotourism for the general public to be developed.

Geomorphosites—Esthetic Landscape Features or Earth History Heritage? is the focus of Chapter 5 by Emmanuel Reynard. He describes the esthetic character of geomorphosites as heritage sites and argues that geotourism development depends on the geohistorical value of geomorphosites and explaining and interpretation of Earth's history and processes. The link between the esthetic dimension of geomorphosites and geotourism are illustrated with two examples: glacier tourism and geocultural sites.

In Chapter 6, Afat Serjani describes Albania's geoheritage and geotourism through the pioneering work of writing the first geotourism book in Albania. This work presented the main chapters of the first book of the series: "Geoheritage and Geotourism in Albania" for the selection of important Earth science sites, and the classification and categorization of geological sites for geotourism development.

Further promotion of geotourism in a fascinating island archipelago belonging to Portugal is outlined by Eva Almeida Lima and Marisa Machadoin the Azores UNESCO Global Geopark (Chapter 7). The chapter highlights a number of planning and management efforts to promote the development of a sustainable tourism industry by integrating geotourism into its overall destination development strategy. They argue that the main challenge to this new form of tourism, geotourism, is to keep the balance between the enjoyment into the geolandscapes, geological heritage, and the geoconservation. Additional key points are outlined including the integration of the existing services and infrastructures with new interpretative services and products that allow the implementation of a high-quality geotourism in this archipelago.

The topic of the "Search for the World's Top Geotourism Destinations" is the topic of Chapter 8 by Murray Gray. The list presents sites that are both internally geodiverse and represents the world's geodiversity. Gray listed all the wonderful landscapes he has been to and considers as eye-catching and amazing. He proposed that the world's top 10 geotourism destinations are: Brazil/Argentina, Zimbabwe/Zambia, the United States, Australia, China/Vietnam, Switzerland, Bolivia, Iceland, and South Africa. However, these places are neither necessarily the best place on the Earth nor a perfect one for geological heritage interpretation, but the examples are a combination of outstanding natural beauty presenting geological features. Seemingly some of these spots are an ideal area for practicing ecotourism and probably perfect for establishing new geoparks simultaneously. He finishes by suggesting that these sites can be used to raise the public profile of geology, geotourism and geoheritage and also the list should also attempt to include sites from all the continents.

Moving from the Azores Islands to the United States, Ted T. Cable in Chapter 9 considers Interpreting Mining through a case study of a coal mine exhibit. The chapter presents definitions and principles of heritage interpretation and discusses the application of interpretation approaches at the famous coal mine exhibit in the Museum of Science and Industry in Chicago, Illinois (USA). Cable presents potential benefits of using heritage interpretation in interpreting mining and promoting geotourism, and he encourages the application of professional interpretation practices to interpret mining. The chapter presents potential benefits of heritage interpretation to both the visiting public and to the sponsoring institutions.

Geotrails is the focus of Chapter 10 by Thomas A. Hose. This chapter provides a summary of the history, development, and nature of geotrails within the United Kingdom. The chapter necessarily explores the different types of geo-interpretative media, together with a brief consideration of their efficacy, associated with geotrails. It also examines the nature and needs of those persons who access geotrails. Hose suggests that, and indicates some of the ways in which, new geotrails might better appeal and be accessible to wider and younger audiences than those usually targeted by geotrail providers.

Geological and Mining Heritage Interpretation is the focus of Chapter 11 by Ross Dowling. The chapter identifies a number of characteristics of sound geo-interpretation. Dowling describes interpretation before characterizing geological interpretation (geo-interpretation) through a variety of interpretation methods. He then proposes the "ABC" Interpretation Method for geo-interpretation and argues that the key elements of geoheritage are the interpretation of the geological heritage which a visitor is viewing. This is referred to as geo-interpretation which places geology within the environment's **A**biotic (nonliving), **B**iotic (living), and **C**ultural (human) attributes. This chapter illustrates geo-interpretation by showcasing interpretation for three geotourism attractions and three mine sites from six countries around the world.

In Chapter 12, William Witherspoon examines the Evolving Geological Interpretation Writings about a Well-Traveled Part of California, 1878–2016, USA according to the previous nine outstanding geology publications published between 1878 and 2011. These books cover place and routes connected to geology and give a clear explanation of maps designed to be used along the routes. California has a central role in the importance of geoscience concepts including early uses of plate's tectonics to interpret outcrops and landscapes. The significant role of digital tools, particularly Google Earth (R) and Google MyMaps (R) to apply plate tectonics, location

markers, and planning out routes with driving time and also the possibility of social media to build on this foundation are discussed in this chapter.

This theme of the roadside geology is continued in Chapter 13 by William Witherspoon and John Rimel and the authors of this chapter describe Commercially Successful Books For Place-Based Geology: Roadside Geology Covers the U.S.; The *Roadside Geology* series books present interesting geological features and are widely available all over the United States and parts of Canada. The books are considered a valuable source of information for travelers and also a textbook at universities. It is a beginning point for its authors to tie geology to landscape, gold rush and settlement history, fossil collecting, climate history, and specific travel destinations.

From Community Engagement to the impact of Geoparks on the community, Malcolm Cooper and Kazem Vafadari share their experiences with Japanese Geoparks (Chapter 14). This chapter assesses the processes and patterns to be found in the Japanese community's engagement with Geoparks. It is based on trends identified by the authors over the past 15 years and longer, but is a commentary based on the activities of actual communities rather than surveys of tourists. The themes covered are the threads that make up the current community interest in geoconservation, rural decline and revitalization, globally important agricultural and other forms of heritage conservation (Geoparks, GIAHS and cultural heritage, Satoyama), and geotourism in Japan. These themes help us identify the impact of geoparks on the commu-nity, and the Japanese community's engagement with them.

In Chapter 15, Cristian Conibulo and Alexandru Andrășanu examine the role of volunteer management programs in geotourism development. The authors suggest that youth is a reservoir of creativity and energy for any community. If properly engaged and empowered it can have a very high impact on the growth of a geopark. Since 2013, Hațeg UNESCO Global Geopark has developed a Volunteer Program to use and inspire the young people. The chapter outlines the success story of the Volunteer Group in Romania. This chapter shows why volunteers are needed, how a volunteer program works in a geopark and what results were reached for local devel-opment, geoconservation, and geotourism promotion.

Chapter 16 presents a case study on the Geotourism and Proposed Geopark Projects in Turkey (Gülpinar Akbulut Özpay). This chapter includes general information about the geographical and geological characteristics of Turkey. At the same time, this chapter is aimed at determining the proposed geopark projects and the perception of geotourism of Turkey.

Geotourism development in Latin American UNESCO Global Geoparks (Chapter 17, by José Luis Palacio Prieto, César Gosso, Diego Irazábal, José

Patrício Pereira Melo, Francisco do O´de Lima Júnior, Carles Canet, Miguel A. Cruz-Pérez, Erika Salgado-Martínez, Juan Carlos Mora-Chaparro, Krzysztof Gaidzik, Jerzy Żaba, and Justyna Ciesielczuk) is outlined through the developing four UNESCO global Geoparks, establishing the Latin American and Caribbean Geopark Network (GeoLAC) and the development of geotourism in Latin America. The chapter present five case studies from Brazil (Araripe), Uruguay (Grutas el Palacio), and Mexico (Comarca Miner and Mixteca Alta) as well as one aspiring geopark in Peru (Colca y Volcanes de Andagua). The chapter focuses on geoparks registered with UNESCO in Latin America. The authors argue that geotourism displays a growing dynamism and acceptance in various Latin American territories, although there are striking differences in their development. Latin American Geoparks are contrasting territories, some with a long tourism tradition, extensive infrastructure while others are socially and economically marginalized. They describe that geotourism is representing a true development strategy in rural territories in various Latin American territories currently characterized by limited social and economic progress that have led to emigration.

A worldwide growing Dinosaur Geotourism development is the focus of Chapter 18 by Nathalie Cayla. She argues that dinosaurs are not only a very popular science topic but also paleontological tourism highlighting dinosaur paleontological sites is booming. This chapter aims to understand how, over time, the attractiveness of dinosaur geotourism destinations will be elaborated. After having presented the scope of the diversity of dinosaurian outcrops, several case studies illustrate the geotourism trajectories of these sites.

In Chapter 19, Mamoon Allan promotes the concept of "Geotourism for all" through discussing constraints and implications for Accessible Geotourism. He argues that despite the developments in the nature and scope of geotourism experiences in the last decade, people with special needs are generally excluded from different types of geological tourism activities, and to date, geological tours for people with special needs are still very scant. He suggests that it is critical to promote the concept of "Geotourism for all" in different geological tourism sites and to enhance the ethical practices in geotourism business. The chapter identifies the implications for such concepts in the geotourism context.

In Chapter 20, further development and promotion of geotourism is outlined by Bahram Nekouie Sadry. He highlights the development of celestial geotourism and space geotourism through emphasizing the abiotic aspects of environment. He also proposes a categorization for these activities as a

subsegment of geotourism. Managerial efforts to promote the development of a Space, considering parts of the universe as geotourism attractions which will be used as space geological environment in the future, and Celestial Geotourism industry by integrating geotourism into its vertical destination development strategy is also discussed in this chapter. The author argues that the development of celestial geotourism, in terrestrial activities, can be used as a factor that contributes to poverty alleviation and income generation for local communities in remote areas—especially in developing countries, a component resulting in environmental sustainability, and as a platform to promote public space geotourism in developed countries in the future.

In Chapter 21, Krzysztof Gaidzik and Marta Chmielewska outline the opportunities for geotourism in the Post-Mining Objects through a case study of Upper Silesian Coal Basin (USCB) in Poland. They argue that postmining tourism is a very intensively developing branch of geotourism industry and includes tourism of stone quarries, mine sites, exploitation hollows, and postexploitation areas with specific buildings, infrastructure, and culture, that brings out their geo-educational, cognitive, and esthetic values. They suggest that the area of the USCB is a perfect spot for the development of postmining geotourism. The chapter presents the main attractions of the region and aims to present some of the so-called hidden potential of this region, that is, smaller or lesser-known post-mining sites, waste dumps, and objects with different functions. The authors believe that appropriate regional policy and promotion, long-term sustainable development, and geoprotection of the present geoheritage will lead to geotourism development and economic growth of the USCB postmining area.

The penultimate chapter (Chapter 22) is on the Langkawi UNESCO Global Geopark. Kamarulzaman Abdul Ghani outlines the popularity of Langkawi as an island holiday destination and its sizeable number of visitors. He addresses the fact that an increasing number of uncontrolled and unregulated visitors would cause serious sustainability issues regarding over development in various areas of the ecosystem, namely environment, waste disposal, electricity, and water supply. This chapter seeks to discuss the issues of conflict and balance between mass tourism, overtourism, and geopark tourism, specifically geotourism and what the outlook of Langkawi UNESCO Global Geopark could preferably be.

In Chapter 23, the final chapter of the book, the editor synthesizes the topics discussed in the book. While reviewing the topics covered by contributors, I manage to introduce some new matters. In order to expand concepts, various theoretical and practical observations are brought together; I also develop

some policies and strategies essential for geotourism planning and expansion. In this way, the chapter's main effort is to provide a deep insight into geology and tourism and leaves a list of items to be discussed in the future.

ACKNOWLEDGMENTS

I am very grateful for help from Fatemeh Fehrest and Susan Turner, which has improved the chapter.

KEYWORDS

- **geotourism definitions**
- **geotourism industry**
- **the basic principles of geotourism**
- **Tourtellotic geotourism**
- **true geotourism**
- **key components of geoparks**

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The Geotourism Industry in the 21st Century

The Origin, Principles, and Futuristic Approach

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"An important book because it brings together the interpretive and management aspects of geotourism on a global scale. It reveals geotourism's potential to popularize the fundamentals of geoscience and open up new pathways of sustainable economic development. . . . This book will help geopark managers, geoscience educators, and all researchers and students of geotourism to use those 'things themselves' to instill bone-deep awareness of how the planet works. It will also help them use geotourism to create economic value for alleviating poverty, while protecting resources for future generations."

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ABOUT THE EDITOR

Bahram N. Sadry, PhD, is an Adjunct Senior Lecturer and a Geotourism Consultant. Dr. Sadry conducts research in the fields of geotourism, ecotourism, and wildlife tourism and heritage interpretation. He has published several books and textbooks on geotourism and has undertaken geotourism consultancy projects for the private sector. He is also an education consultant and a curriculum developer on tourism and geotourism in higher education and has conducted geo-tour guide training courses for his national government. Dr. Sadry is deeply involved in the development of geotourism and is a passionate advocate for the creation of national geoparks and UNESCO Global Geoparks around the world.

ISBN: 978-1-77188-826-4

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